

A Regiment for the Sea, ^{Gr.}

Containing verie necessarie matters for all

sorts of men and traauilers; wherevnto

is added an Hydrographicall discourse

touching the five seuerall passa-

ges to Cattay; written by

william Borne.

Now corrected and amended by Thomas Hood; who

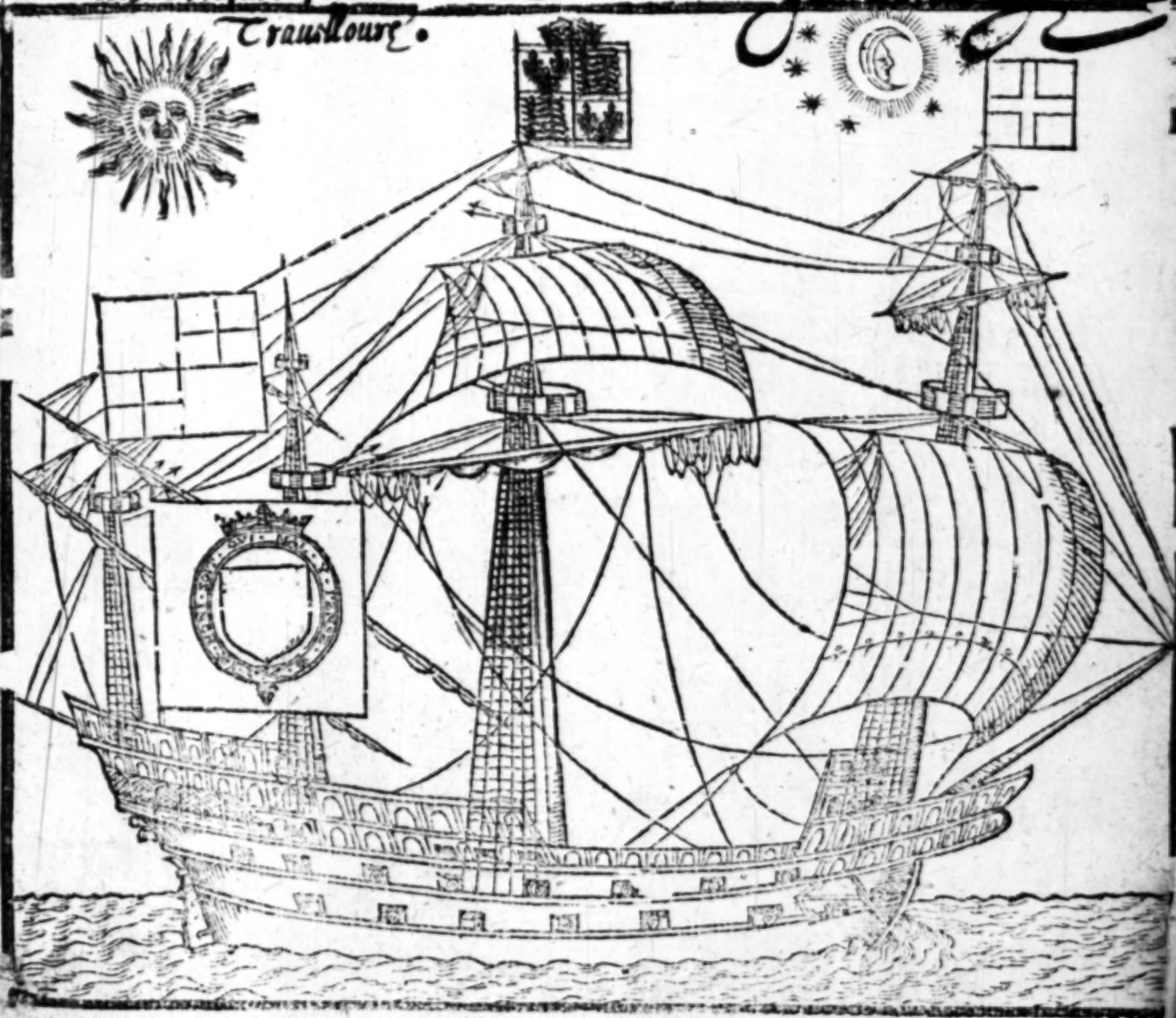
hath added a new Regiment, and Table

of declination.

His Treasurie for

Travellours.

gabriel harvey.



Imprinted at London by T. Est. for Thomas Wight.

Presented for the Sec.

to the Trustees of the British Museum

on the 10th of June 1841

by the Hon. the Sec. of the Admiralty

in pursuance of a Resolution of the Admiralty



Printed by J. G. & J. W. for Thomas W. & Co.

To the Right Honorable George Earle of Cum-
berland, Barone Clifford. Lord Bromflet, Atton, Vescie
and Vypont. Lord of Westmerland and knight of
the most honorable order of the Garter.



Hen this booke Right Honorable was first
imprinted, it came forth vnder the patronage
of the Right Honorable *Edward Earle of*
Lincolne, sometimes Lord High Admirall of
England: That impression being disperfed it
hath been thought good, that the booke shold
be corrected & put vnto the presse againe, the labour was
assigned vnto me: the which I was willing to vndertake,
both because it was earnestly requested, & I adiudged it
profitable for the cōmon wealth: but being readie to come
foorth it wanted a patron, which was not conuenient being
so honorably protected heeretofore, and deseruing now as
well, as it hath alwaies done. Wherefore deuising with my
selfe vppon this occasion to commend it to the Honorable
Tuition of some worthie man, I was moued to dedicate it
vnto your Honour: first by the generall consent of many,
who wish you well & iudge you a fitte patrone for such
a worke: secondly by the honorable fauour, which (as occa-
sion hath beene offered) I haue alwaies found at your Ho-
nours hands: thirdlie by the inclination of your mynde to
marine causes. If therefore right Honorable the consent of
manie, mine owne thankfull minde, whereof this is a signe,
or your Honours inclination to these studies, may either
seuerallie one by one, or ioyntlie altogether moue you to the
Tuition of this worke, it shalbe sufficiently defended (as I
hope) from enuious tongues, & I by your fauour shalbe in-
uited continuallie to imploie my pen to the commoditie of
my countrie, & to make my prayer for your Honours dayly
increase in all good things.

Your Honours most humblie
affectionate T. Hood.

A.ii.

To the Reader.



Entle reader this being the third time of the impression of this booke it hath seemed good vnto Maister T. Wight, who hath the interest therin, to inuite mee by a friendlie consideration for thy benefite to correct the same; wherein I haue induored my selfe to amend such things as desired a correction; what they are & how iustlie they are amended you your selfe may iudge by comparing the former impression with this. My request is that my labour may be construed in good part, because I haue vndertaken it for the cōmon benefite, especiallie of the saylers, to whom generallie I wish wel. Which if you shall do, I shall not onely thincke my laboure well bestowed, but shalbe readie to giue an onset to a further matter to all such as haue a desire to Nauigation; or genenallie to the Mathematicall studies. Farewell.

Thine T. Hood.



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To the Reader.



Cherle Reader, I haue thought it good now in this Impression to mend or correct certaine faults that were in the first, but most specially in the second impression: for that it was printed the second time I not knowing thereof, so that it had not onely those faults that were printed out of y^e first written coppie, but now a nūber of new faults more thā that it had in the first: wherefore I haue not onely mended and corrected those faults, but in like maner I haue added other necessarie matters, not befoze this time printed, as this. What eccentricitie is; and also what Parallel is, and his vse; as it doth appeare in the 6 folio of the booke. And also I haue in like maner shewed how that seamen shall know when that the Moone is in hir slow and swift motion, which is knowen by the Pyrie; as it is declared in the third Chapter. And also how for to know the Moones latitude; as it is shewed in the fourth chapter. And also I doe show in the first chapter, the cause y^e there is more daies from the Equinoctiall of March vnto the Equinoctiall of September; then there is from the Equinoctiall of September, vnto the Equinoctiall of March. And also I haue added vnto the tenth chapter, certaine matters as touching discoveries vnto the north parts. And furthermore, I haue shewed in the fouretēne chapter how for to know how fast or softly that any ship doth goe, & how for to keepe a perfect account of the ships way. And also I haue altered cleane the seuentēth chapter, & shewed how that the sea-men shall know what part or quantitie y^e they haue passed or gone of the whole earth, whereby that they should know the diuersitie of aspects, as the Eclipses of the Moone, and the alteration of time; and also I haue added diuers thinges in sundrye places of

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To the Reader.

of the Booke, that I doe omit for breuitie. And in like manner I haue added vnto the ende of the booke, a Hydrographical discourse for to goe vnto Cattay fine seuerall or sundry wayes; that is to say, the first way is about by Cape bone sperance, which is that way that the Portugals doth goe vnto Calicut, and vnto the Moluccas, and other places in the East Indies: The second way is through the Straights of Magellane, into the South sea. The third way is towards the Northwest, whereas captaine Forbisher and Christopher Hall, hath begunne the discoverie now called Meta Incognita. And the fourth way is by the Northeast by the coast of Noua Zembla, that master Stephen of Borrose hath begun that discoverie. And the fifth way is by the North Pole, if that it be nauigable, &c.

Now it is possible that I may be enuied of diuers and sundry people, for that I haue written this discourse of the passages vnto Cattay; for that the nature of a number of men is to dislike of all things not done by themselves: But notwithstanding all is one vnto mee, whether they doe like or dislike. For that I doe know some persons hath alreadie made euill report of that I haue written before this time, yet notwithstanding I will not stay my pen for their mallice: for although their skilles is much more than mine, my meaning is not to teach any of them, but to instruct the simplest sort of sea-men, for to shew vnto them such thinges as is necessary for them for to know. And also some sorte of people are of that nature, if that they write or talke of any thinges past their capacitie, then they will say that he can talke well; but they themselves cannot talke but they can do; but this is the truth, whatsoener he be that will say that he can doe any thing, and if that he cannot shew the reason of the doing thereof, I doe say vnto you hee can not doe it; and this is most certaine, for if that he doth it, hee doth it but

To the Reader.

but by fortune; even as he that drew his bow by chance, in the Asirians hoast, and slew Achab the king of Israell: as we doe reade in the third booke of the Kings and the last chapter, when that Iosaphat the king of Iuda, and Achab King of Israell, went to battaile against Ramoth in Gilead.

For this is generall amongst Sea-men and also Gunners, how simple or without skill soever that they be; if that they haue once taken charge to be the master of a Shippe, he thinketh great scoone to learne at any mans hand; but will bragge of himselfe how long he hath bene a master, and God knoweth vtterly without skill, but that hee is a coaster, and doth know the markes for to carrie a Shippe ouer the Landes ende, and ouer the Paase.

But good simple menne, if that they could not doe that, then there were nothing in them: For euery man must needes be skilfull and know that place that a number of times he hath occupied, and hath bene taught vnto him.

And who doubteth but a simple Fisherman of Warking, knoweth Warking Cræke, better than the best Pa- uigator or master in this lande: so who doubteth, but these simple men doth know their owne places at home. But if they should come out of the Ocean Sea to seek our Channell, to come vnto the River of Thames; I am of that opinion, that a number of them doeth but grope as a blinde man doth; and if that they doe hit well, that it is but by chaunce, and not by any cunning that is in him.

But I doe hope that in these dayes, that the knowledge of the masters of shippes is very well mended; for I haue knowen within this 20 yeres, that them that were auncient masters of shippes hath derided and mocked them that haue occupied their sardes and plattes; and

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+ also the obseruation of the altitude of the Pole, saying: that they care not for their Shepes skinnes; for he could keepe a better account vpon a board.

And when that they dyd take the latitude, they would call them starre shooters and sunne shooters; and would aske if they had striken it. Wherefore now iudge of their skills; considering that these two⁺ points is the principall matters in Navigation. And yet these simple people will make no small bragges of themselues, saying: that he hath bene master this twenty yeres, and neuer had no mis fortune; and also if that they could heere of any, that did vse Plats & instruments that had any misfortune, then they would not a little brag of themselues, what notable fel lowes they themselues were.

What a notable folly was in these men, not considering what they themselues were. For this is most certaine, that it is not wisdom nor cunning, that can preuent nor alter Gods prouidence, if that it pleaseth him to lay his scourge vpon vs. For if that men through cunning could prouide that no misfortune should happen vnto them, then were they Gods and not men; and yet notwithstanding wee must not condemne cunning and knowledge, but put all things vpon Fortune, the you may take one from the plough, and make him master of a ship, and say he hath good fortune. And thus (gentle Reader) I cease, requesting thee to accept this as a simple present, proceeding of god will.

Thine, W.B.

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The Regiment for the Sea.

FOR that the common people doe fall into such a number of errours as touching the length of the daye, holding an opinion, that in every fiftene dayes, the day is an houre longer or shorter, the truth is this: the day doth keepe no such proportion in the lengthning and shortning, but doth lengthen and shorten according unto the swift, slow, and standing of the Sunnes declination: for when the sunne hath swift declination, then both the day lengthen and shorten a pace: and when that the declination is slow, then doth the day lengthen or shorten but slowly. And yet the most part of the common people doe hold an opinion, that at Christmasse or else at New yeres day at the furthest, the day must needs be an houre longer, and yet the sunne hath not declyned or come towards the Equinoctial two degrees and a halfe, which will not make halfe an houre in the length of the day: wherefoze I doe think it good to declare through the whole yere, when the day is an houre longer or shorter here in this place, for the latitude or height of the Pole articke at London, the Pole being raised fiftie one degrees, thirtie two minutes, or thirtie foure minutes: and our longest Summer day is 16. houres and a halfe, and our shortest Winter day seven houres and a halfe, from the rising of the sunne unto the setting of the sunne: and first this: the shortest winter day, is the 11 or 12 day of December, and then the sunne riseth a quarter of an houre after eight, & setteth a quarter of an houre before foure of the clocke, and the Sunne hath his greatest declination unto the southwards.

The 29 day of December, the day is a quarter of an houre longer, and the sunne riseth at eight of the clock, and setteth at foure. The 17 or 18 of Januarie, the day is an houre longer and not before, for the sunne must be declined from his Solstice of winter, five degrees & twelue minutes, before the day is lengthened an houre, so that I doe affirme, that from the fourth or fift day of Nouem-

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ber, vnto the 17 or 18 day of Januarie, in all that time the day is but one houre shorter and longer, which is the time of ten weekes. The 27 or 28 of Januarie the night is fiftene houres long, then riseth the sunne halfe an houre after seuen, and setteth halfe an houre after foure of the clock. The seuenth or twelfth day of Februarie the day is ten houres long, then riseth the sunne at seuen, and setteth at fise of the clock. The six & twentieth day of Februarie the day is a leauen houres long, then riseth the sunne halfe an houre after sixe, & setteth halfe an houre after fise of the clock. The leuenth day of March, then the sunne is in the Equinotiall, & the day iust 12 houres long. The 24 day of March, the day is 13 houres long, and then riseth the sunne halfe an houre befoze sixe, and setteth halfe an houre after 6 of the clock. The seuenth daye of Aprill the day is foureteene houres long, and then riseth the sunne at fise of the clock iust, and setteth at seuen of the clock iust. The 23 day of Aprill the day is fiftene houres long, and then riseth the sunne halfe an houre befoze fise, and setteth halfe an houre after seuen of the clocke. The 15 day of May the day is 16 houres long, then riseth the sunne at foure of the clocke, and setteth at 8 of the clocke iust. The leuenth of June the sunne hath his greatest declination to the Northward, and then is our longest summer dayes consisting of sixteen houres and a halfe, from the sunne rising vnto the sunne setting, so that the sunne ryseth a quarter of an houre befoze foure, and setteth a quarter of an houre after eight of the clock. The tenth daye of Iuly the daye is sixteen houres long, then riseth the sunne at foure, and setteth at eight of the clock. The last day of Iuly, the day is fifteen houres long. The 16 day of August the day is foureteen hours long. The last day of August the day is 13 houres long. The thirteene or foureteene of September the sunne is in the Equinotiall and the day iust 12 houres long.

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long. The 27 day of September the day is a 11 houres long. The 11 day of October the day is ten houres long. The 26 day of October the day is 9 houres long. The 15 day of November the day is 8 houres long: and so vnto the 11 or 12 day of December, at which time the day is at the shortest, as before is declared.

Thus much haue I sayd, as touching the length of the day by euen houres, which some people will haue at the entrance of the Sunne into the 12 signes, but it is not so, yet this you may obserue that when the sunne hath declined five Degrees and twelue minutes in this our latitude, then is the day one houre longer or shorter. You shall finde this matter moze largely spoken of, concerning the length of the day in all places thzough the world, in the 11 Chapter of the Booke.



A Table of the reigne of Kings

since the Conquest.

| Number of Kings and Queenes. | The names the kings of England | Beginning of their Regime | Time of their death. | The place of their buriall |
|---------------------------------|-----------------------------------|------------------------------|-------------------------|-------------------------------|
| 1 | Willia Conqueroz | 14 Oct. | 9 Sept 1087 | Cane in noz |
| 2 | William Rufus | 9 Sept. | 1 Augu 1100 | Westminst |
| 3 | Henrie the first | 1 Aug | 2 Decē 1136 | Reding |
| 4 | Stephan | 2 Decē | 25 Oct 1154 | Feuersham |
| 5 | Henrie the second | 25 Oct | 6 July 1189 | ſtoteuerard |
| 6 | Richard the first | 6 July | 6 April 1199 | ſtoteuerard |
| 7 | John | 6 April | 19 Octo 1216 | Worcester |
| 8 | Henry the third | 19 Oct | 16 Jon 1272 | Westminst |
| 9 | Edward the first | 16 Jo | 6 July 1307 | Westminst |
| 10 | Edward the second | 6 July | 25 Jan 1327 | Gloster |
| 11 | Edward the third | 25 Jan | 21 Jun 1377 | Westminst |
| 12 | Richard the second | 21 June | 16 Sep 1400 | Westminst |
| 13 | Henrie the fourth | 16 Sep | 20 Mar 1413 | Cāterburie |
| 14 | Henrie the fifth. | 20 Ma | 31 Aug 1422 | Westminst |
| 15 | Henrie the sixt | 31 Aug | 4 Mar 1561 | Winſore |
| 16 | Edward the fourth | 4 Mar | 9 April 1483 | Winſore |
| 17 | Edward the fifth | 9 April | 22 Jun 1484 | Westminst |
| 18 | Richard the third | 22 Jun | 22 Aug 1486 | Leycester |
| 19 | Henrie the ſeuenth | 22 Aug | 22 Apr 1509 | Westminst |
| 20 | Henrie the eight | 22 Apr | 28 Jan 1547 | Winſore |
| 21 | Edward the ſixt | 28 Jan | 6 July 1553 | Westminst |
| 22 | Queene Marie | 6 July | 17 Pou 1559 | Westminst |
| 23 | Queene Elizabeth | 17 Jo | | |

The Kalender.

Januarie hath xxxi. daies.

Februarie hath xxviii. daies.

& in the yeare of Bissex-
tilis xxix daies.

| | | | |
|----|----|---|-------------------|
| 3 | 1 | a | New yeares day |
| | 2 | b | Octa. Stepha. |
| 11 | 3 | c | Octa John |
| | 4 | d | Octa Inno. |
| 19 | 5 | e | Chesolopho hi. |
| 8 | 6 | f | Twelte day. |
| | 7 | g | Julian mart. |
| 16 | 8 | a | Seuerine Bish. |
| 5 | 9 | b | Martian Virg. |
| | 10 | c | Paule first her. |
| 13 | 11 | d | Sunne in Aquar. |
| 2 | 12 | e | Satire mar. |
| | 13 | f | Oct. Cippha. |
| 10 | 14 | g | Isidore mart. |
| | 15 | a | Daurice |
| 18 | 16 | b | Anthony Abbot |
| 7 | 17 | c | Parcelle Bish. |
| | 18 | d | Palce Bish. |
| 15 | 19 | e | Mart. and his fel |
| 4 | 20 | f | Fabian and Sa. |
| | 21 | g | Agnus virg. |
| 12 | 22 | a | Vincent mar. |
| 1 | 23 | b | Emerice |
| | 24 | c | Timothie discip. |
| 9 | 25 | d | Con. of Paule |
| | 26 | e | Politarp. mart. |
| 17 | 27 | f | Chyloft. Doct. |
| 6 | 28 | g | Theodoze |
| | 29 | a | Valerie Bish. |
| 14 | 30 | b | Tran S. marke |
| 3 | 31 | c | Ciri. and Jan. |

| | | | |
|----|----|---|---------------------|
| | 1 | d | Brigit Fast. |
| 11 | 2 | e | Puri. of Mary |
| 19 | 3 | f | Blase mart. |
| 8 | 4 | g | Gilbert Confess. |
| | 5 | a | Agathe Virg. |
| 16 | 6 | b | Dorothie Virg. |
| 5 | 7 | c | Amandus Bish. |
| | 8 | d | Salomon |
| 13 | 9 | e | Sunne in Pisces |
| 2 | 10 | f | Sothor bishop |
| | 11 | g | |
| 10 | 12 | a | Eufraze virgin |
| | 13 | b | Valentine bish. |
| 18 | 14 | c | Faulstine Bish. |
| 7 | 15 | d | Julian virgin |
| | 16 | e | Constance virgin |
| 15 | 17 | f | Simeon martir |
| 4 | 18 | g | Cabine Priest |
| | 19 | a | |
| 12 | 20 | b | 60 martirs |
| 1 | 21 | c | 70 martirs |
| | 22 | d | Peters Chaire |
| 9 | 23 | e | Sirener Fast |
| | 24 | f | Mathie Apostle |
| 17 | 25 | g | Policar Bishop |
| 6 | 26 | a | Victor and his fel. |
| | 27 | b | Agustine Bishop |
| 14 | 28 | c | Alwale Bishop |

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March

The Kalender.

March hath xxxi, daies.

Aprill hath xxx. daies.

| | | | |
|----|----|---|------------------|
| 3 | I | d | David Bishop |
| | 2 | e | Basilic mart. |
| 11 | 3 | f | Marine mart. |
| | 4 | g | Lucius mart. |
| 19 | 5 | a | Focius mart. |
| 8 | 6 | b | Wict. and benin. |
| | 7 | c | Tho de Aquin. |
| 16 | 8 | d | Apoline mart. |
| 5 | 9 | e | 40. Martirs |
| | 10 | f | Gregorie bishop |
| 13 | 11 | g | Sunne in Aries |
| 2 | 12 | a | Zacharie bishop |
| | 13 | b | Longine mart. |
| 10 | 14 | c | Patricius bishop |
| | 15 | d | Certrude virgin |
| 18 | 16 | e | Anselme. |
| 7 | 17 | f | Edward King. |
| | 18 | g | Joseph spons. |
| 15 | 19 | a | Cutbert bishop |
| 4 | 20 | b | Benedict. Abbot. |
| | 21 | c | Affrodose bishop |
| 12 | 22 | d | Pigment. bishop |
| 1 | 23 | e | Theodoze. |
| | 24 | f | Fast |
| 9 | 25 | g | Annun of Mary. |
| | 26 | a | Castore marter |
| 17 | 27 | b | John Beremy. |
| 6 | 28 | c | Dorothe marter |
| | 29 | d | Custace. |
| 14 | 30 | e | Sabine virgin |
| 3 | 31 | f | Balbine virgin |

| | | | |
|----|----|---|------------------|
| | 1 | g | Theodoze virgin |
| 11 | 2 | a | Mary Egiptian |
| 19 | 3 | b | Richard Bishop |
| 8 | 4 | c | Ambrose Bishop |
| | 5 | d | Marci. and Ma. |
| 16 | 6 | e | Sextus mart. |
| 5 | 7 | f | Cuphemi. virgin |
| | 8 | g | Denise mart. |
| 13 | 9 | a | Perpetuus bishop |
| 2 | 10 | b | Percus mart. |
| | 11 | c | Sunne in Taurus. |
| 10 | 12 | d | Appoline martir |
| | 13 | e | Sother mart. |
| 18 | 14 | f | Liburt mart. |
| 7 | 15 | g | Dimond bishop |
| | 16 | a | Isidoze bishop |
| 15 | 17 | b | Anicete bishop |
| 4 | 18 | c | Cluther Bishop |
| | 19 | d | Liburtius Conf. |
| 12 | 20 | e | Hermogenes |
| 1 | 21 | f | Quintine. |
| | 22 | g | Clete Bishop |
| 9 | 23 | a | Gojge marter |
| | 24 | b | Wilfride Conf. |
| 17 | 25 | c | Marke Euangel. |
| 6 | 26 | d | Anastace Bishop |
| | 27 | e | Vitalis mart. |
| 14 | 28 | f | Peter of Pi. |
| 3 | 29 | g | Clete Bishop |
| | 30 | a | Dep. of Erken. |

May

The Kalender.

May hath xxxj. daies.

Iune hath xxx. daies.

| | | | |
|----|----|---|--------------------|
| 11 | 1 | b | Philip and Iacob |
| | 2 | c | Athanasius bish. |
| 19 | 3 | d | Inn. of the crosse |
| 8 | 4 | e | Christopher |
| | 5 | f | S. Augustine |
| 16 | 6 | g | John Doct lat. |
| 5 | 7 | a | John of Beuer. |
| | 8 | b | Appe. of Rich. |
| 13 | 9 | c | Tras. of Pi. |
| 2 | 10 | d | Gordaine. |
| | 11 | e | Sunne in Gemini |
| 10 | 12 | f | Victorius mart. |
| | 13 | g | Servatius Con. |
| 18 | 14 | a | Boniface mart. |
| 7 | 15 | b | Sophia virgin |
| | 16 | c | Brandon bishop |
| 15 | 17 | d | Trans. of Bar. |
| 4 | 18 | e | Dioscor. martir |
| | 19 | f | |
| 12 | 20 | g | Dunstan conf. |
| 1 | 21 | a | Barnardine |
| | 22 | b | Helene Quene |
| 9 | 23 | c | Petronil. |
| | 24 | d | Julian virg. |
| 17 | 25 | e | Desidere mart. |
| 6 | 26 | f | Adelme. Conf. |
| | 27 | g | |
| 14 | 28 | a | Germaine bish |
| 3 | 29 | b | Nicodeme. |
| | 30 | c | Corne mart. |
| 11 | 31 | d | Felix bishop |

| | | | |
|----|----|---|------------------|
| 19 | 1 | e | Nicodeme. |
| 8 | 2 | f | Crasimus |
| | 3 | g | Basill. |
| 16 | 4 | a | Parcel martir |
| 5 | 5 | b | Petrocius Conf. |
| | 6 | c | Boniface bishop |
| 13 | 7 | d | Hedard and Gil. |
| 2 | 8 | e | Trans. Edmond. |
| | 9 | f | Puan Confes. |
| 10 | 10 | g | Tran. of Wol. |
| | 11 | a | Barnabe Apostle |
| 18 | 12 | b | Sunne in Taurus. |
| 7 | 13 | c | Anthony Confes. |
| | 14 | d | Basilides con. |
| 15 | 15 | e | Wate modeste. |
| 4 | 16 | f | Trans. Richard |
| | 17 | g | Botolph confes. |
| 12 | 18 | a | Cruperie bishop |
| 1 | 19 | b | Servatius mart. |
| | 20 | c | Tran. Edward. |
| 9 | 21 | d | Walburge vir. |
| | 22 | e | Albane mart. |
| 17 | 23 | f | Fast |
| 6 | 24 | g | John Baptist |
| | 25 | a | Trans. of Clig. |
| 14 | 26 | b | John and Pa. |
| 3 | 27 | c | Trescens mart. |
| | 28 | d | Fast |
| 11 | 29 | e | Peter and Paule. |
| | 30 | f | |

The Kalender.

Iuly hath xxxj. daies.

August hath xxxj. daies.

| | | | |
|----|----|---|-----------------|
| 19 | 1 | g | Ota. John Bap. |
| 8 | 2 | a | Alit. of Mary |
| | 3 | b | Gregory Bishop |
| 16 | 4 | c | Domitius mart. |
| 5 | 5 | d | Parthene Con. |
| | 6 | e | Procope mart. |
| 13 | 7 | f | Zenone mart. |
| 2 | 8 | g | Paterian bishop |
| | 9 | a | Pius bishop |
| 10 | 10 | b | Dog daies beg. |
| | 11 | c | Verinaco. for |
| 18 | 12 | d | Anacleto bishop |
| 7 | 13 | e | Quirine and Ju. |
| | 14 | f | Sunne in Leo |
| 15 | 15 | g | Marine virgin |
| 4 | 16 | a | Symph. cum 7 |
| | 17 | b | Arlene hem. |
| 12 | 18 | c | Praxedes virgin |
| 1 | 19 | d | Margar. Virgin |
| | 20 | e | Praxedes Virgin |
| 9 | 21 | f | Appoline bishop |
| | 22 | g | Mary Magdalen |
| 17 | 23 | a | Christian |
| 6 | 24 | b | Fast |
| | 25 | c | James Apostle |
| 14 | 26 | d | Anne mo. of Da. |
| 3 | 27 | e | Panthalcon |
| | 28 | f | Sampson bishop |
| 11 | 29 | g | Mary Virgin |
| | 30 | a | Abho. and sen |
| 19 | 31 | b | German Bishop |

| | | | |
|----|----|---|----------------------|
| 8 | 1 | c | Lammas |
| 16 | 2 | d | Stephen bishop |
| | 3 | e | Finding of Ste. |
| 5 | 4 | f | Justine Priest |
| | 5 | g | Festum nuns |
| 13 | 6 | a | Transla. Domini |
| 2 | 7 | b | Feast of Jesu |
| | 8 | c | Ciracke and his fel. |
| 10 | 9 | d | Roman. martir |
| | 10 | e | Laurence martir |
| 18 | 11 | f | Tiburt and Su. |
| 7 | 12 | g | Clare Virgin |
| | 13 | a | Polite Virgin |
| 15 | 14 | b | Sunne in Virgo. |
| 4 | 15 | c | Assumption of Mary |
| | 16 | d | Roche Confess. |
| 12 | 17 | e | Ota Laurence |
| 1 | 18 | f | Agapite martir |
| | 19 | g | Lewes bishop |
| 9 | 20 | a | Dog daies end. |
| | 21 | b | Anastase martir |
| 17 | 22 | c | Tim and Hip. |
| 6 | 23 | d | Cleazor. Fast |
| | 24 | e | Bartholmew Apostle |
| 14 | 25 | f | Lewes King |
| 3 | 26 | g | Zepherine bishop |
| | 27 | a | Rufus martir |
| 11 | 28 | b | Augustine bishop |
| | 29 | c | John beheaded |
| 19 | 30 | d | Felix and Auda |
| | 31 | e | Cuthber Virgin |

September

The Kalender.

September hath xxx, daies.

October hath xxxj. daies.

| | | | |
|----|----|---|------------------|
| 8 | 1 | f | Giles Abbot |
| 16 | 2 | g | Anthony martir |
| 5 | 3 | a | Eupheme |
| | 4 | b | Doses Do. |
| 13 | 5 | c | Menturine |
| 2 | 6 | d | Zacharie Prop. |
| | 7 | e | Enurce bishop |
| 10 | 8 | f | Patience of Pa. |
| | 9 | g | Bozgone martir |
| 18 | 10 | a | Nicholas de To. |
| 7 | 11 | b | Protere and Vi. |
| | 12 | c | Sire bishop |
| 15 | 13 | d | Philip bishop |
| 4 | 14 | e | Sunne in Libra |
| | 15 | f | Nicodeme Priest |
| 12 | 16 | g | Coth Virgin |
| 1 | 17 | a | Lambart bishop |
| | 18 | b | Uidoz and Coz. |
| 9 | 19 | c | Eustace. |
| | 20 | d | Fast |
| 17 | 21 | e | Mathew Apostle. |
| 6 | 22 | f | Daurice |
| | 23 | g | Line martir |
| 14 | 24 | a | German Abbot |
| 3 | 25 | b | Cleophin and Ap. |
| | 26 | c | Ciprian and Jul. |
| 11 | 27 | d | Cosme and Da. |
| 19 | 28 | e | Cripere bishop |
| | 29 | f | Michaell Arch. |
| 8 | 30 | g | Hierome Doct. |

| | | | |
|----|----|---|---------------------|
| 16 | 1 | a | Remigius bishop |
| 5 | 2 | b | Leodegar martir |
| 13 | 3 | c | Candide martir |
| 2 | 4 | d | Frances martir |
| | 5 | e | Faith virgin |
| 10 | 6 | f | Gerionis |
| | 7 | g | Marce and mar. |
| 18 | 8 | a | Apolinaris mart. |
| 7 | 9 | b | Delagi vergin |
| | 10 | c | Linus Confess. |
| 15 | 11 | d | Denice and his fel. |
| 4 | 12 | e | Nichasius bishop |
| | 13 | f | Wilfride bishop |
| 12 | 14 | g | Sunne in Scorpio. |
| 1 | 15 | a | Calixt bishop |
| | 16 | b | Wolfran bishop |
| 9 | 17 | c | Nich. of the mount |
| | 18 | d | Luke Euangelist |
| 17 | 19 | e | Etheldred virgin |
| 6 | 20 | f | Friswide virgin |
| | 21 | g | Austrebet virgin |
| 14 | 22 | a | ri. P. Virgins |
| 3 | 23 | b | Mary Salome |
| | 24 | c | Romane bishop |
| 11 | 25 | d | Agloze bishop |
| | 26 | e | Chzisp. and Chzif. |
| 19 | 27 | f | Fast |
| 8 | 28 | | Simon and Iude. |
| | 29 | | Parcellus bishop |
| 16 | 30 | | Germaine Conf. |
| 5 | 31 | | Fast |

9 Cth

Nouem-

The Kalender.

Nouember hath xxx.daies. December hath xxxj.daies

| | | | | | |
|-------|---|------------------|-------|---|------------------|
| 1 | d | All Saints. | 1 | f | Clegi Bishop |
| 13 2 | e | All Soules. | 13 2 | g | Liban mart. |
| 2 3 | f | Wenefride virg. | 2 3 | a | Dep. of Osmond. |
| 4 | g | Amantius. | 4 | b | Barbara Virg. |
| 10 5 | a | Lete Priest. | 10 5 | c | Sabba Bishop. |
| 6 | b | Leonard | 6 | d | Nicholas bishop |
| 18 7 | c | Wilboze. | 18 7 | e | Octa. Andrew. |
| 7 8 | d | Four crowned. | 7 8 | f | Con. of Marie. |
| 9 | e | Theodore | 9 | g | Cyprian bishop |
| 15 10 | f | Martine. | 15 10 | a | Eulalie Virgin |
| 4 11 | g | Martine bishop | 4 11 | b | Antippe. |
| 12 12 | a | Brise bishop | 12 12 | c | Damase Conf. |
| 12 13 | b | Sunne in Sagit. | 12 13 | d | Sunne in Capric. |
| 1 14 | c | Tran. Erkenew. | 1 14 | e | Picatus virgin |
| 15 | d | Macute bishop | 15 | f | Othalie virgin |
| 9 16 | e | Dep. of Edmond. | 9 16 | g | Sapientia. |
| 17 17 | f | Init Reg Elizab. | 17 17 | a | Lazarus con. |
| 17 18 | g | Octa. Martine | 17 18 | b | Gratian bishop |
| 6 19 | a | Elizabeth mart. | 6 19 | c | Genetia virgin. |
| 20 | b | Edmond King. | 20 | d | Fast |
| 14 21 | c | Pres. of Mary | 14 21 | e | Thomas Apostle. |
| 3 22 | d | Cicely virgin | 3 22 | f | rrr. martirs. |
| 23 | e | Clement mart. | 23 | g | Victor virgin |
| 11 24 | f | Grigogen mart. | 11 24 | a | Fast. |
| 19 25 | g | Catherine virg. | 19 25 | b | Christmas day |
| 26 | a | Line mart. | 19 26 | c | Stephen Mart. |
| 8 27 | b | Vitalis Conf. | 8 27 | d | John Euangel. |
| 28 | c | Rufus mart. | 28 | e | Innocents day |
| 16 29 | d | Saturni. Fast. | 16 29 | f | Tran. of James. |
| 5 30 | e | Andrew Apostle. | 5 30 | g | Silvester mart. |
| | | | 13 31 | a | |

A Ta-

A Table or Kalender for 24. yeeres,
 shewing the Prime, the Sundaies letter, and leape yeare,
 and the moouable feasts, as the first Sunday in
 Lent, and Easter day, Ascension day,
 and VVhitsunday.

| The year of our Lord | The Prime | Dominical Letter. | First Sunday in Lent. | Easter day | Ascension day. | Whitsun- day |
|-------------------------|-----------|----------------------|--------------------------|------------|-------------------|-----------------|
| 1579 | 3 | d | 8. March. | 19. Aprill | 28. May | 7. June |
| 1580 | 4 | cb | 20. febru. | 3. Aprill | 12. May | 22. May |
| 1581 | 5 | a | 12. febru. | 26. March. | 4. May | 14. May |
| 1582 | 6 | g | 4. March. | 15. Aprill | 24. May | 3. June. |
| 1583 | 7 | f | 17. febru. | 31. March. | 9. May | 19. May |
| 1584 | 8 | ed | 8. March | 19. Aprill | 28. May | 7. June |
| 1585 | 9 | c | 28. febru. | 11. Aprill | 20. May | 30. May |
| 1586 | 10 | b | 20. febru. | 3. Aprill | 12. May | 22. May |
| 1587 | 1 | a | 5. March | 16. Aprill | 25. May | 4. June |
| 1588 | 12 | gf | 24. febru. | 7. Aprill | 16. May | 26. may |
| 1589 | 13 | e | 16. febru. | 30. March | 8. May | 18. may |
| 1590 | 14 | d | 8. March | 19. Aprill | 28. May | 7. June |
| 1591 | 15 | c | 21. febru. | 4. Aprill | 13. May | 23. may |
| 1592 | 16 | ba | 12. febru. | 26. March | 4. May | 14. may |
| 1593 | 17 | g | 4. March | 15. Aprill | 24. May | 3. June |
| 1594 | 18 | f | 17. febru. | 31. March. | 9. May | 19. may |
| 1595 | 19 | e | 9. March | 20. Aprill | 29. May | 8. June |
| 1596 | 1 | dc | 28. febru. | 11. Aprill | 20. May | 30. may |
| 1597 | 2 | b | 13. febru. | 27. March. | 4. May | 15. may |
| 1598 | 3 | a | 5. March | 16. Aprill | 25. May | 4. June |
| 1599 | 4 | g | 25. febru. | 8. Aprill | 17. May | 27. may |
| 1600 | 5 | fe | 9. febru. | 23. March. | 1. May | 11. may |
| 1601 | 6 | d | 1. March. | 12. Aprill | 21. May | 31. may |
| 1602 | 7 | c | 21. febru. | 4. Aprill | 13. May | 23. may |
| 1603 | 8 | b | 13. March | 24. Aprill | 2. June | 12. June |

A profitable and necessary rule to know the beginning and ending of euerie Tearme, with their Returnes.

Hillarie Terme beginneth the xxiii. of January, if it be not Sunday, which then is referred vntil the next day after, and endeth the xii. of February, and hath foure Returnes, that is to say:

| | |
|------------------|-------------------|
| Octauis Hillarij | Crastino Purific. |
| Quind. Hillarij | Octauis Purific. |

Easter Tearme beginneth xvii. daies after Easter, and endeth the Sunday next after the Ascention day, & hath five Returnes, that is to say:

| | | |
|---------------|---------|-------------------|
| Quind. Pasch. | Mens. | Quinque Paschæ, |
| Tres Paschæ. | Paschæ. | Crast. Ascention. |

Trinitie Terme beginneth the friday next after Trinitie Sunday, and endeth the Wednesday fortnight after, and hath foure Returnes, that is to say:

| | |
|-------------------|--------------------|
| Crast. Trinitatis | Quind. Trinitatis, |
| Octauis Trinita. | Tres Trinitatis. |

Michalmas Terme beginneth the ix. day of October, if it be not Sunday, and endeth the xxviii. or xxix. of Nouember, and hath eight Returnes, that is to say:

| | |
|------------------|------------------|
| Octauis Michael. | Crast. Animarum. |
| Quind. Michael. | Crast. Martini. |
| Tres Michaelis. | Octa. Martini. |
| Menſe Michael. | Quind. Martini. |

Note also that the Erchequer openeth eight daies before any tearme begin, except Trinitie tearme, which openeth but foure daies before. 9 JJ 62

Thirtie daies hath September, Aprill, Iune, & Nouember, Februarie hath xxviij. alone: and all the rest thirty & one.

An introduction vnto the 1

Regiment for the

SEA.

The names of certaine things necessary to be knowne of them that are Marriners or Seafaring men, meete to be knowne of them that do practise Nauigation, as this: the names of the circles of the Sphere, & what they are, and their vses: and also the names of other things belonging thereunto, and what they are, and their vses.

First, what the Horizon is.

The Horizon is a great circle of the globe diuiding the part of the world sene, from the part vnseene: and this Horizon is changed when you doe moue: for as you do by trauaile change your place, so both the Horizon alter continuallie.

The vse of the Horizon circle.

The vse of the Horizon is this, the height of the Sunne or any Starre is counted from it vpwrd, the which height is taken with the crosse staffe, setting the one ende with the Horizon, and the other ende with the Sunne or starre, so that you haue a true Horizon: The which true Horizon is to be found onelis at the Sea, or else vpon a very plaine ground vpon the top of a hill. Moreover if the Sunne or Moone, or any starre bee to be sene, then they be aboue the Horizon: if they be not to be sene, then they be vnder the Horizon.

2 What the Meridian is.

The Meridian is a great circle beginning due South, & so passing by your Zenith, that is right ouer the crowne of your head, and so by the two Poles of the world: and

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The Regiment for the Sea.

7 What the Antarcticke circle is, being
a Paralel circle.

The Antarctick circle doth touch the Horizon due South, and is opposite or right against the Arcticke circle, & doth widen & narrow in all pointes as the Arcticke circle doth, not differing from it, saving that the Arcticke circle is above the Horizon, and the Antarcticke circle is underneath the Horizon.

The vse of the Antarcticke circle.

The vse of the Antarcticke circle, is to know what starres will not appeare above your Horizon, so that to the Northwards of 66. degrees and a halfe, the Sunne or Moone being in the Tropicke of Capricorne will not rise above the Horizon.

8 What the Zodiacke is, being a circle.

The Zodiacke is a great circle in the heauens vnder the which all the wandering lights or Planettes doe keepe their courses, that is to say, the Sunne & Moone, & the other five Planets or starres, Saturne, Iupiter, Mars, Venus, & Mercurie. This circle is diuided into twelue equall partes called the xii. signes, which are these, Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, the said circle standeth oblique or awrie, crossing the Equinoctiall in the middle at two places: and is 12. degrees broad, that is to say, sixe degrees from the middest Northward, and sixe degrees vnto the Southward.

The vse of the Zodiacke.

The vse of the Zodiacke is, to know in what time the Sunne and Moone, and the other Planets are, and also to know the time of the change of the Moone, with all the other

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other aspects : and in like manner to know the aspects of all the other Planets vnto the Moone, & also the planets amongst themselves : and by the aspects in the rii. signes is gathered their nature, and in what Countrie they may happen.

9 What the line Eclipticke is.

The line Eclipticke is a Circle in the very middle of the Zodiacke, vnder the which the very middle or center of the Sunne doth continuallie moue.

The vse of the line Eclipticke.

The vse of the line Eclipticke is this, if that the Moone or any other starre, be vnto the North part thereof, then it is said, that they haue North Latitude, and if vnto the South part, than they haue South Latitude: and also by this Circle called the line Eclipticke, is knowen the Eclipse of the Sunne and the Moone.

10 What the Arcticke polar circle is, being a paralel circle.

The Arcticke polar Circle, is made by the pole of the Zodiacke, or pole of the circle Eclipticke 23. degrees and a halfe distant from the poles of the world.

11 What the Antarticke Polar circle is, being a Paralel circle.

The Antarticke Polar circle, is iust opposite vnto the Arcticke Polar, made by the Antarticke pole.

12 What the two circles called Colures be, &c.

The 2. Circles called Colures, be those that doe denide the Zodiacke, and all the other paralel circles, into foure equall parts, the one of the circles both crosse the Zodiacke in the first point of Aries and Libra, and so passeth by the poles of the world, and is called the equinoctiall co-

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lure: and the other Colure circle doth crosse the Zodiacke in the first point of Cancer & Capricorn, and so passeth the 2. Poles of the world, and at the 2. Poles the one circle doth crosse the other: and that is called the solstitiall Colure.

The vse of these two circles.

12 The vse of the two Colure circles is this, the sunne passing by them, doth deuide the yere into 4. parts in this manner, the sunne in the first point of Aries, & in the time, &c.

13 What the two poles of the world are.

The 2. Poles of the world, (that is to say, the North Pole called the Pole Arcticke, and the south Pole called the Pole Antarticke) are two points in the heauens whereof the one is directly against the other, at the ends of the Arctike of the world: the North Pole is alwaies aboue your Horizon, & the south Pole Antarticke alwaies vnder our Horizon, and the Equinoctiall iust and equally betwene them, from these two poles there must be vnderstood, a right line to be drawen which is called the Arctike of the world about the which the whole heauens and all the lights of the firmament be caried round about from the East vnto the west in xxiij. houres: so that no light nor place in the heauen remaineth vnremoued, but onely the two poles of the world, and the said Arctike.

The vse of the Poles of the world.

The vse of the two poles is this, to know how farre we do transport our selues, and to know what Climate, & temperatnesse we be in, as touching heat and cold.

14 What the two Poles of the Zodiacke are.

The two poles of the Zodiacke or Eclipticke, imagined to be at the ende of the Arctike of the Zodiacke or Eclipticke, are the Arcticke pole of the Zodiacke or rather the Eclipticke, & the Antarticke pole of the Zodiacke or the Eclipticke,

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Eclipticke, to be iust or equall betwene them.

15 What the Zenith or verticall point is.

The Zenith or verticall point, is imagined to be a pike in the heauens right ouer the crowne of your head, and is moueable as we our selues be, and is the Pole of the Horizon circle: and as you doe transport your selfe from one place vnto another, so both your Zenith or verticall point, and your Horizon circle also change.

The vse of the Zenith or verticall point, &c.

The vse of the Zenith or verticall point is this, to know how neere or how far of, any starre is from your Zenith, by taking the true height of any starre with an instrument, so that from your Zenith, is alwaies 90. degrees downe vnto the Horizon on euerie side round about you, as it shall more plainely appeare hereafter, where I speake of degrees.

16 What a degree is.

A degree is the part or diuision of a whole circle diuided into 360. equall parts, how big or small soeuer y circle be.

The vse of the degrees is manyfold.

The vse of the degrees, is to know by the summe and howes course in the Zodiacke, or any other of the Planets or moueable starres, how many degrees they be asunder: whereby is knowne at what time they haue any aspect the one with the other. And also by the degrees it is knownen what latitude & what declination any light or starre hath from the Eclipticke or Equinoctiall: and also the degrees will shew vnto you how many miles that you doe transport your selfe, vpon the earth to the south

or

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02 North parts, for that euerie degree doth aunswere vnto 60. English myles, in the going South and North: which is knowen by the altitude of the North Pole, 02 the number of degrees betwene the Equinoctiall & your Zenith 02 verticall point, for from your Zenith vnto the Horizon, is 90. degrees to the Southwards, and 90. degrees vnto the Northwardes, which is halfe the compasse of the heauens, for twise 90. is 180. and then the earth doth hide the other halfe of the heauens: and twice 180. maketh 360. the whole content of the compasse of euerie great Circle in the heauens.

17 What a Minute is.

Of Minutes there be two sorts, minutes of time, and minutes of measure, and is no other thing but the 60. part of a degree, 02 the 60. part of an houre: and all the deuisions in these matters is by 60. For as 60. minutes is a degree, 02 an houre, so 60. seconds is a minute, and 60. thirds is a second, and 60. fourths is a third, &c.

18 Altitude or height, and the vse thereof.

Altitude 02 the height of any thing taken (as the height of the Sunne 02 any starre, 02 the height of the Pole aboue the Horizon: 02 the height of a steeple, 02 tower, 02 such other like,) is the length of the right line contained betwene the center of the Sunne 02 starre, 02 betwene the toppe of any thing whose height we desire to know & the Horizon, limited and expressed by the degrees 02 parts of that instrument wherby we take the said height.

19 Latitude or widenesse: the vse thereof.

Latitude is in the heauens: if the Pole 02 any other starre be vnto the South partes, 02 the North partes of the Eclipticke, that then it is sayd, to be so many degrees in latitude 02 widenesse, from the line Eclipticke to the South

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South or North part : and also Latitude is counted vpon the earth in like maner, if y^e you be in any place betwene the equinoctiall & any of the two Poles, and it is expressed by the degrees of y^e Meridian contained betwene the equinoctiall & the Zenith or verticall point of the place wher in you are, either to the South or North part. &c.

20 Longitude or length : the vse thereof.

Longitude in the heauens is, the portion of the ecliptick, contained betwene the head of Aries, and that great circle which is drawen from the Poles of the Ecliptick thorough the center of the Sunne or any other starre whatsoeuer, downe vnto the Ecliptick, the which Longitude is expressed either by the number of degrees contained in the said portion of the Ecliptick, or else by that signe and the particular degrees of that signe vpon which the foresayde great circle drawen from the Poles of the Ecliptick doth light. As for example, if the portion of the Ecliptick contained betwene the head of Aries and that great circle which is drawen from the Poles of any starre, vnto the ecliptick, do comprehend 100.200. or 300. &c. degrees, then is the Longitude of that star said to be so much, or otherwise if the said great circle light vpon any signe as vpon Taurus or Gemini, then is the starre said to haue his longitude in Taurus, &c. And also Longitude vpon the earth, is counted from the Canarie Ilands vnto the Eastward, and it is that portion of the Equinoctiall which is contained betwene the Meridian of the Canarie Ilands, and the Meridian of the place assigned. This Longitude is denominated and expressed by the degrees of the Equinoctiall contained betwene the two foresaide Meridians, so that if betwene the said Meridians there be contained 20.30.40. &c. degrees then is the assigned place said to be so much in Longitude, wherby is knowne the time of the chaunges of the Moone, or any other aspect, or any E-

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ecliptic

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clipse of the Sunne or Moone at the Citie or towne.

21 **Declination** is leaning: the vse thereof.

Declination is counted in the heauens, if that the Sun or any other star be vnto the North part or South part of the Equinoctiall, & it is designed or expressed by the degrees of the great circle drawen from the Poles of y^e world through the center of the sunne or star contained betwene the Equinoctial and the center of the sunne or starre propounded, wherby it is said, that the sunne or starre hath so many degrees of declination to the South, or to the North parts as it happeneth &c.

22 **A Circumference** is the line which incloseth a circle by the outer edge.

23 **Diameter** is the bredth of a circle, passing right ouer y^e center or middle thereof, from outside vnto outside.

24 **Center** is the middle prick in any circle, equally distant from the edge of the circle in euery place.

25 **A Paralel lines or circles** are, two lines or more, (how many soener there be) equally distant in euery place alike.

26 **Augue**, what it is.

Augue is a point in the heauens, when the Sunne or Moone is eccentricke, going nearer vnto the heauens, and further from the earth, than hir common order is: and the opposition thereof is, when that the Sunne & Moone doe come nearer vnto the earth, than they doe at any other tyme.

The vse thereof.

The vse thereof is, to know when that they be in their swift motion, or in their slow motion: for the Sunne and Moone

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None being in the ~~same~~ ~~place~~ ~~the~~ in the opposite of the Ange.

27 Eccentricitie, what it is.

Eccentricitie is the distance betwene the eccentricke circle of any Planet and the center of the world.

28 What the head or tayle of the Dragon is.

The head of the Dragon, is the place where that the None or any other Planet doth come ouer the line Ecciptick from the South part vnto the North part: and the taile of the Dragon is, where the None or any other Planet passeth ouer the lyne Ecciptick, from the North part, vnto the South part.

The vse of the head and tayle of the Dragon.

The vse of the head and taile of the Dragon, is to know, when that there is any Eclipse of the Sunne or None: and of what quantitie or greatnes the Eclipse is.

29 Paralax what it is.

Paralax is the portion of the heauen contained betwene 2 right lines, whereof the one is drawen from the center of the world, the other from the surface of the earth, through the center of the None or some other Planet, vnto the Primum mobile.

Additions

The vse thereof.

The vse of the Paralax is manifold, for that it sheweth where and in what countries the Sunne may be eclipsed as in some places the Sunne may be all wholly eclipsed and in some place halfe eclipsed, and in some partes of the earth nothing eclipsed at all, and yet the Sunne

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and

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and the *Moone* both about the *Horizon*, which reason is before shewed. And also the vse of *Parallax* is, if that you do see any extraordinary light in the heauens, as *Comets* or blazing *starres*, by their *Parallax* their distaunce is knowne what they are, and by their distance their *Diameter* being taken, then the magnitude of the body is knowen, therfore there be great things to be knowne by the obseruation of the *Parallax*.

30 What Nauigation is.

Nauigation is an Art teaching how to direct our course in the sea, to any place assigned, & by what direction, what things may stand with him, and what things may stand against him, hauing consideration how to preserve the ship in all stormes and changes of weather that may happen by the way, to bring the ship safe vnto the port assigned, & in the shortest time.

The vse of Nauigation.

The vse thereof is this, first to know how that the place doth beare from him, by what winde or point of the compass, and also how farre that the place is from him, & also to consider the streame, or tide gates & Currents, which way that they doe sette or driue the ship, and also to consider what dangers is by the way, as Rocks and sands, & such other lyke impediments, and also if that the winde change or shift by the way, to consider which way to stand, and direct his course vnto the most aduantage, to attaine vnto the port in shortest time: and also if any stormes do happen by the way, to consider how soe to preserve the ship and the goods, and to bring hir safe vnto the port assigned. And also it is most principally to be considered and foretold, that if they haue had by occasion of a contrary tempest,

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best, for to goe very much out of the course or way, to know how the place doth then beare, that is to saye, by what point of the compasse the place doth stande from you: and also how farre it may be from you. Which way to be knowen, is this: first, to consider by what point that the ship hath made hir way by, and how fast or slowe that the ship hath gone, and to consider how often that the ship hath altered hir course, and how much that shee hath gone at euery time, and then to consider all this in your plat or card, & so you may giue a nere gesse, by what point or winde it beareth from you, and also how farre it is thether. And also you may haue a great help by the Sun or starres, to take the height of the pole aboue the Horizon, and also in some place you may gesse by the sounding, both by the depth and also by the ground. And also it is very meete and necessary to know any place when that he hath se it.

31 Of Instruments to vse at the Sea, for to take the height of the Sunne, or any Starres.

The originall of the making of all Instruments to take the height of the Sunne or any starre, is either a circle, or the part of a circle, whose diuision is into 360. parts, what forme so euer that it hath, as your crosse staffe it is marked according vnto the proportion of a circle: & euery one of the degrees is the equall part of a circle, namely, the three hundred and sixtie part, &c.

The vse of the Instruments.

The vse of the Instruments, as Astronomical rings, or the crosse staffe, is to take the height of the Sun or other starres, whose vses doe follow here after in the booke.

The Regiment for the Sea.

32 What manner of persons be meetest to take charge of Ships in Nauigation.

As touching those persons that are mete to take charge, that is to say, to be as Master of Shippes in Nauigation, he ought to be sober and wise, & not to be light or rash headed, nor to be too sumith or hasty, but such a one as can well gouerne himselfe, or else it is not possible for him to gouerne his company well: he ought not to be too simple, but he must be such a one as must keepe his company in awe of him (by discretion) doing his company no iniury or wrong, but to lette them haue that which men ought to haue, and then to see vnto them that they doe their labour as men ought to do, in all points. And the principal point in gouernment is, to cause himselfe, both to be feared and loved: that groweth principally by this meanes, to the other men in well doing, and those men that be honestly adicted, to let them haue reasonable preheminance, so that it be not hurtfull vnto the Merchant, nor to himselfe, and to punish those that be malefactors and disturbers of their company, and for small faults to giue them gentle admonition to amend them: and principally these two points are to be foresene by the Masters, (that is) to serue God himselfe, & to see that all the whole company do so in like maner, at such conuenient time as it is mete to be done: the second point is, that the maister vse no play at dice or cardes: neither (as nere as he can) to suffer any, for the sufferance thereof may do very much hurt, in diuers respects: and furthermore, the master ought to be such a one, as doth know the good course, wherby he doth know at what time to be full sea, or a low water, knowing in what quarter or part of the skie, the good one doth make a full sea at that place, and also the master ought to be acquainted, or know that place well, that he doth take charge to go vnto (except that he haue a Pilot) and also

he

The Regiment for the Sea. 8

he that taketh charge vpon him, ought to be expert how the tide gates or currents, doe set from place vnto place: and also not to be ignorant of such daungers as lyeth by the way, as rocks, sands, or bancks, and also most principally, he ought to be such a one as can very well direct his courses vnto any place assigned, and to haue capacitie how for to handle or shift himselfe in foule weather or stormes. And also it behoueth him to knowe the height of the sunne, to knowe every place by the sight thereof. And also he that taketh charge for long voyages, ought to haue knowledge in plats or cartes, & also in such instruments, as he muste to take the height of the sunne or any starre, and to haue capacitie to correct those instruments, and also he ought to be such a one, that can calculate the sunnes declination, or else to haue some true regiment, & also he ought to knowe how to handle the sunnes declination, when that he hath taken the height of the sunne.

Now beginneth the Regiment for the Sea, the first Chapter of Nauigation, & sheweth what the 32. points of the Compasse is, and to what vses they doe serue.

THE first and most principall thing for any seafaring man, or traualer, is to know toward what part of the earth he meaneth to goe, and then being vpon the sea, where he seeth no path nor marke to trauaile by, hee ought to be expert in the vse of the Ruedle or Compasse. Wherein this is to be noted: there be eight capitall or head windes or points, whereof foure of them are called Cardinales, & haue their names properly of themselves, & the other foure of them, are deriued or take their names of the other foure, as this: South and North are in the opposite points of the intersection of the Horizon & Meridian, & East is in the intersection of the Equinotial & the Horizon, towards the sun rising, & west is right against it.

North

8. Capitall
or head
points.

The Regiment for the Sea.

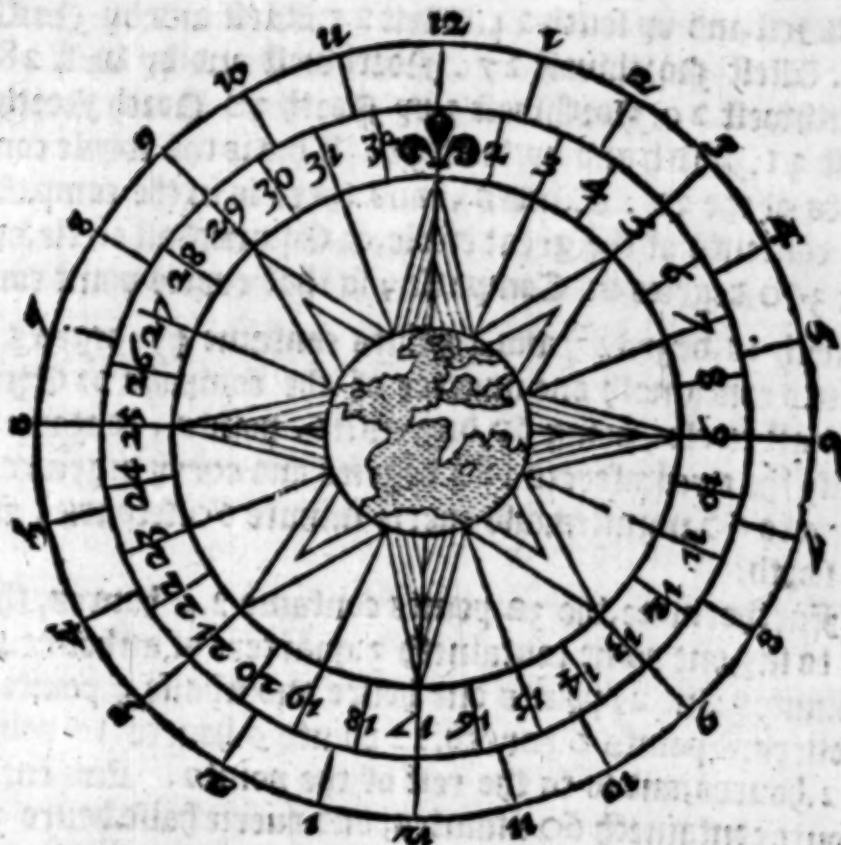
8. inferior
points or
winds.

North-east is in the midway betwene the East & the North, and Southeast in the midway betwene the East and the South, and south-west betwene the West & the South, & North-west is in the middle betwene the North and the West. Moreover there be eight inferior points or windes, halfe way betwene euerie one of those eight capitall or head points or windes, and those haue the names of the two points that he standeth betwene, as that point that standeth betwene the North and the North-east, is called North North-east, and that point betwene the East and the North-east, is called East North-east, & also that point that is betwene the East and the Southeast, is called East Southeast. And so forth vnto the rest of the eight points, whose names both folow, as South Southeast and South south-west, and West south-west, & West North-west, and North North-west: and now betwene euerie one of these inferior points, and euerie one of the head windes there is a by-point or wind, and he is called a by-point, for that he is not named but by the name of one of the head points next adioyning. There be 16. of them in number, so that there be eight capitall or head points, and eight in feriour points, and 16. by-points or winds, so that in all there be 32. of them. The vse of these points is, to direct the shippe to what quarter of the world

16. by-
point or
winds.
Addition

you-doe assigne, to keepe that course, to finde the place so assigned, for that the propertie of the Needle or Flie, is alwaies to stand due South and North.

As



As touching Navigation, for the instructions of the meanest, I have set this figure of Compasse where first is to be noted the 32. winds & points of the compasse aboue made. The flouredeluce is the first point, and these be the names beginning at the North, & so with the course of the Sunne, according unto the common order that sea-men doth teach or instruct theyr youth, which is this. North 1. North and by East 2. North Notheast 3. North east and by North 4. Northeast 5. Northeast & by East 6. East Northeast 7. East & by North 8. East 9. East & by South 10. East Southeast 11. Southeast & by East 12. Southeast 13. Southeast & by South 14. South southeast 15. South & by east 16. South 17. South & by west 18. South Southwest 19. Southwest & by south 20. South
C.
South

The names of the 32. points of the compasse.

The Regiment for the Sea.

The contents of
Equinoctiall circle
360. degrees one
point of the Com-
passe containeth 11
degrees & a quar-
ter.
The 32.
points
brought
into 24.
houres.

Southwest 21. Southwest & by west. 22. West southwest
23. West and by south 24. West 25. West and by North
26. West Northwest 27. Northwest and by west 28.
Northwest 29. Northwest & by North 30. North North-
west 31. North and by west 32. This is the whole con-
tents of the 32. Windes, and there is in the compasse
the contents of the great circle, or Equinoctiall circle, be-
ing 360. degrees in Compasse, so that euerie point con-
taineth 11. degrees $\frac{1}{4}$ and 4. points containe 45. degrees. 8
points containeth one quarter of the compasse or Equi-
noctiall circle, being 90. degrees. 16. points, containeth
halfe the circumferēce 180. degrees, and euerie degré con-
taineth 60. minutes, and euerie minute 60. seconds, and
so forth.

Furthermoze, the 32. points containe 24. houres, that
is to say, one point containeth 3. quarters of an houre 45.
minutes. And 2. points one houre and a halfe. 4. points 3.
houres. 8 points 6. houres. 12 points 9. houres. 16 points
12. houres, and so to the rest of the points. And euerie
houre containeth 60. minutes, and euerie halfe houre 30.
minutes, and euerie quarter of an houre 15. minutes, and
after that rate 45. minutes maketh three quarters of an
houre.



The

The second Chapter treateth of the Golden number or prime, shewing the Epact, and by the Epact, to know the age of the Moone.



It is necessarie and convenient for the seafaring men, to know the Prime or golden number: for by the golden number is known the Epact; and the Epact sheweth the age of the Moone or change day, within 12. houres under or ouer: and by the age of the Moone, you may know at what a clocke it doth flow in any place that you doe know what Moone doth make a full sea: therefore it is mete to know the Epact, and that is known by the Prime, or Golden number. The cause why it was called the golden number, was because it was sent out of Egypt in letters of golde, to the Romanes.

The cause why that it is called the Prime, was for that it was the first order that the Moones course was known by, & it is thus known. Adde one to the yeere of our Lord whereof you would know the Golden number or Prime, then deuide the number by 19. the remainder is the Prime: and multiplie that by 11. and take what the number cometh vnto, deuide that by 30. the remainder is the Epact. Then when you haue once the Epact, adde 11. to your Epact for euerie yeere moze, and take what that cometh to, that is your Epact: and if it do passe 30. put that away, and keep the remainder for your Epact. And thus this rule will serue for ever, saving when the Prime beginneth at one, for then the Epact is 11. & then do (as aforesaid) as you may perceiue by this table here following.

The cause why that it was called the Prime or Golden number. To know how many the Epact is.

The Regiment for the Sea.

The Table of Prime and Epact

for xix. yeeres, and when those xix. yeeres
be ended, then beginne againe, and so
it will serue for euer, &c.

| The yeere of the Lord. | Prime. | Epact. | The yeere of the Lord. | Prime. | Epact. |
|---------------------------|--------|--------|---------------------------|--------|--------|
| 1593 | 17 | 7 | 1603 | 8 | 28 |
| 1594 | 18 | 18 | 1604 | 9 | 9 |
| 1595 | 19 | 29 | 1605 | 10 | 20 |
| 1596 | 1 | 11 | 1606 | 11 | 1 |
| 1597 | 2 | 22 | 1607 | 12 | 12 |
| 1598 | 3 | 3 | 1608 | 13 | 23 |
| 1599 | 4 | 14 | 1609 | 14 | 4 |
| 1600 | 5 | 25 | 1610 | 15 | 15 |
| 1601 | 6 | 5 | 1611 | 16 | 26 |
| 1602 | 7 | 17 | | | |

The
Prime is
the time
of xix.
yeeres.

The Prime or golden number, is the time of 19.
yeeres, in the which time the Moone maketh all her
chaunges or coniunctions with the sunne, and when
these nineteene yeeres be expired, she be beginneth againe:
as for example. In the yeere of our Lord. 1579. shee
changed the 26. day of March, & euery yeere doth alter 11.
daies of her change, till y^e yeere 1568, & then she chaung-
eth the said twentie sixe day of March againe, as I shew-
ed you before: the Epact is the putting to 11. for euery
yeere. Now furthermore to know the age of the Moone,
doe thus, take the number of the Epact for your yeere
(beginning at March alwaies) and reckon how many
months it is from March, (counting March for one) then
recker

reken how many daies of the moneth it is, in which you would know the age of the Moone: then put all your number together, (that is to say, your Epact, your moneth from March, & euerie day of the Moneth) they looke how many it amounteth vnto, that is the age of y^e Moone if the number added doth not excede 30. but if it passe 30. throw all the 30. away, & keepe that which will not be 30. for when the age of the Moone is iust 30. then is it the change day. This is to be vnderstood concerning those moneths which haue 31. dayes, for in them that haue onelie 30. dayes the coniunction is at the 29. day, and they which passe 29. are the age of the Moone: Item vnto Februarie we must giue 29. days though ordinarily that moneth hath but 28. days, and if it be the sixteenth day of the age of the Moone, then the Moone is at the full. When the age is betwene seauen days and eight, then is the first quarter. And if it be 22. daies old, then the Moone is at the last quarter: The rule is manifest in this example, this yere. 1593. I looke and finde the Epact 7. for the yere: I would know the age of the Moone the 13. day of June. I reken how many moneths it is from March, reckening March for one, and I find it is foure moneths: then I take and adde all these together, that is to say 7. for the Epact, and foure for the moneths (that is to say, March, April, May, June,) & then 13. for the day of the moneth, and all cometh to 24. So that you may conclude, that the Moone is 24. dayes olde, and was at the full 10. dayes before.

To know
the age of
y^e Moone,
by y^e num-
ber of the
Epact.

¶ The third Chapter treateth how to know by the age of the Moone, what houre it doth flow, or is full Sea at any place, where you doe know what Moone maketh a full Sea.

Now by the age of the Moone you may know at what houre it is a full sea in any place where you doe know what Moone maketh a full sea, which rule commonly the

The Regiment for the Sea.

To know
the altera-
tion of
the tides.
in 24.
houres.
An ensam-
ple for the
full Sea
vpon the
lands end
for euerie
day of the
Moone.

To shift
the Sunne
and the
Moone by
the points
of the co-
passe.

sea men call, the shifting their sunne and Moone, & many waies there be to doe it, for thus they may do it: let them diuide one houre into five parts, & then take foure of those parts, and put the fift part away, that serueth for the alteration of the moones course in 24. houres, and the foure fift parts of an houre are 48. minutes, & the fift part of an houre is 12. minutes. A floud & an ebbe doth alter 24. minutes forwards: as thus for example: it floweth 12. of the clocke at the lands end, vpon the chaunge day, y^e Moone being in the south, at all times a full sea. The moone being one day olde, it floweth 12. of the clocke 48. minutes two dayes olde, it floweth one of the clocke 36. minutes, thre dayes olde, it floweth 2. of the clocke 12 minutes: 4. dayes olde, it floweth 3 of the clocke 24 minutes: five dayes olde, it floweth 4. of the clocke iust 6 daies olde, it floweth 4. of the clocke, 48. minutes: seauen daies olde: five of the clocke 36. minutes, eight daies olde. 6 of y^e clocke 24. minutes 9. dayes olde, seuen of the clocke 12. minutes: ten dayes olde, it floweth 8. of the clocke iust 11. daies olde. 8 of the clocke 48. minutes 12. dayes. 9 of the clocke 36. minutes: 13. dayes old. 10. of the clocke 24. minutes 14. days old, it floweth 11. of the clocke 12. minutes 15 daies old, it floweth 12. of the clocke iust, then begin the full moone: & so begin againe as you did befoze at one day olde, and so forth. For to finde the course of the tides is nothing else but to adde for euerie day of y^e age of the moone an houre, pulling backe the 5. part of an houre (being 12. minutes) and by this account, you may at all times know at what a clocke it doth flow, by putting to euerie floud & ebbe 24. minutes, & to 2 flouds & 2 ebbs putting to 48. minutes. Now furthermore, the seamen vse to make their account by this meanes (but it is all one) they doe allow for euerie day of the age of the moone, one point and thre minutes: for a point of the compasse containeth 45. minutes, that is 3 quarters of an houre. Then they put thre minutes to 45 minutes.

The Regiment for the Sea. 12

minutes, which maketh 48. minutes, the said 3 minutes is the 15. part of a point, & from the chaunge to the ful is 15 dayes, so y (the halfe compasse being 16. points) they break the odde point into 15. parts, & y commeth to 3 minutes, so that y alteration of the tides, for euerie 24. houres be 48. minutes, or the 4 fifth partes of an houre. Wherefore there shall folow a table of tides, about certaine places of this realme: for euerie mone containeth 29 dayes 12 houres 44 minutes from chaunge to chaunge: the whole contents of the houres of the mone, be 708. houres, & 44. minutes. And there is in euerie yere 12 chaunges of the mone: & the yere containeth 365 dayes, 5 houres 55. minutes 26 seconds. Yet some do affirme to be odde 6 houres but there lacketh 4 minutes 47 seconds in the Tropicall yere. Likewise in the yere be 12 moneths agreable to the 12 moones: the 12 moones containe but 354 daies, so that there be xi. daies more in y yere, than there be in the 12 moones. The yere also is deuided into 12 moneths which months haue taken their names at the will & pleasure of menne: as first Januarie was so called of Ianus, who had two faces: for the month of Januarie beholdeth the ende of the yere past, and the beginning of the yere to come. Februarie tooke his name of certaine Romane sacrifices, called Februa. March is so called of Mars, for Romulus so named it after the name of his father. Aprill comes of Aperio, because that then the earth is opened. May, of Maia, the mother of Mercurie. June so called by preparing the yong men to the warre. July, of Iulius Caesar: and August, of Augustus Caesar, for in that moneth he entred the Consulship: then the rest of the moneths tooke their names of their number from March. Now these 12 months which maketh the yere, the sunne doth passe or go through the Zodiack called the 12 signes, which is the occasion of the yere: for this is to be noted, y the sunne, as I said befoze, doth go by his naturall mouing

The contents of the number of dayes and houres in one moon y houres in euerie moone be 708.44. minutes. The content of a yere is 365. dayes 5. houres 55. minutes. How the moneths tooke their names,

The Regiment for the Sea.

The Zodiacke
compryneth
306. de-
grees.
The mo-
ving of 24
houres.

The time
that the
Moone go-
eth thro-
row the
12 signes.

The three
motions
of the
Moone.
Of Auge.

+
The
cause, why
the Moone
chargeth
rather or
later.

in 365. daies. 5. houres. 55. minutes, 26. seconds, through the Zodiack, containing 360. degrees, his course being against the 24. houres, going from the west into the East, against the course of Primum mobile, or first mouer, being moued by the mightie prouidence of God, which maketh the 24. houres: & so doth all the 7. lights or Planets, (except) that it be in their retrogradation: but the sunne and the moone be neuer retrograde, as the other five Planets or lights be. And this is to be noted, that the Moone goeth faster then the sunne, for she goeth through the whole Zodiacke, in twentie seauen dayes and eight houres. Now in that same time the sunne is remoued by his natural mouing from that place of the Zodiacke nere twentie seauen degrees: and then because that the Moone hath not found the sunne there, it is two dayes, foure houres, and foure and fortie minutes more, before that the Moone ouertaketh the sunne againe, so by that meanes, it is 29 dayes, twelue houres, and foure and fortie minutes betwene the chaunge of the Moone, and the next chaunge, throzow the yere, although that the Moone may chaunge sometime in lesse time, and sometime in longer time, that is by the meanes of the three motions of the moone, that is to say, her swift motion, and her middle motion, and her slow motion, which groweth by the meanes of the Moones Auge or opposition thereof. The Moone being in Auge, goeth but little more then twelue degrees in foure and twente houres. And in the opposition of Auge nere 15. degrees in 24. houres; and in her middle or equall motion 13. Degrees 12. minutes. So this is the occasion why sometime the moone may chaunge sooner, or be detracted longer then the time of 29. dayes, 12. houres, & fortie foure minutes. This point of Auge is moueable, and doth passe throzow the Zodiacke in the time of 19 yeres: and it causeth sometime the full of the Moone to happen sooner and later. In like manner also the quarters of the moone with,

The Regiment for the Sea. 13

With all the other aspects that the Moone hath with the sunne, or any other of y^e planets, according to the Moones motion. In like maner (by the meanes of the thre motions of the Moone) sometime the Moone goeth more then one point and 3. minutes, in 24. houres, & sometimes lesse then one point and 3. minutes, as this for example: the Moone being in hir slow motion, goeth but little more then 12. degrees in 24. houres, yea & sometimes lesse, and then the sunne in that time doth go one degree: and then is there but 11. degrees betwene the sunne and the moone, (that is but 44. minutes.) So that the moone is not one point in 24. houres from the sunne. But being in hir swift motion she goeth nere 15. degrees in 24. houres, and the sunne goeth one degree in that time: so that there is 14. Degrees in 24 houres, betwene the moone and the sunne, (that is 56. minutes) which is a point, and 11. minutes. Wherefore I doe think it very necessary for to show some, what of the moones motion, y^e they may know when that the moone is either in hir swift motion or hir slow motion, for that I do know that there is not in respect, any seamen that doth know it, because commonly they haue not seamen that hath any sight or knowledge in the Moones Theorickes, therefore let them note these few words following.

Seeke out in the Ephemerides the name of the moneth wherein you would know the swiftnesse or slownesse of the Moones course. In the uttermost columnne answering to that moneth towards the right hand, you shal finde the words Apog: and Perige: whereof the first signifieth the Auge of the Moone, the other signifieth the opposition of the Auge.

The daye of the moneth which standeth against the word Apog: is it whereon the Moone is slowest, the other against which the word Perige: doth stand, is it wherein the moone is swiftest. The which thing you may easely

D,

proue

The Moone goeth in 24. hours sometimes more degrees, and sometime fewer degrees.

The moone is not one point asunder from the Sunne in 24. hours.

Additions

The Regiment for the Sea.

proue true in this maner. Right against the word Apogee
seeke out the place of the Moone toward your left hande
vnder the Charecter of the Moone, subduct that out of the
next number following (by putting thirtie degrees vnto
that which followeth if neede so require) and note the re-
mainder. In like maner against the word Perige: seeke out
the place of the moone, and subduct it out of the next num-
ber following, compare this remainder with the former,
and you shall alwaies finde it to be the greater, whereby
you may conclude the moone then to be in hir swiftest mo-
tion. The like may be wrought by any common Alma-
nacke by subducting the degrees which the moone possesseth
the first daye of the moneth out of the degrees which shee
possesteth the second, and so consequently going on from the
second to the third, foureteene times together, vntill you
finde the greatest or the least remainder. Where you find
the greatest remainder in that signe, and on that day the
moone is in hir swiftest motion and in the opposition of hir
Auge, and 14. after she wilbe in hir slowest motion, in hir
Auge: but where you finde the least remainder there the
moone is slowest, & 14. daies after shee wilbe in hir swif-
test motion: This rule is vnfallible, and therefore is to be
followed rather then that which being grounded vpon the
Prime, is most vncertaine. It is most necessarie for sea-
men to know this swiftnesse or slownesse of the moone in
diuers respects, for if that the moone be in hir swift moti-
on, then it causeth the chaunge, quarter, or full of the
moone to be the rather. But contrariwise, when that the
moone commeth from hir slow motion, then that doth de-
tract the tyme the longer before the moone doth chaunge,
or is at the full or any other aspect.

The
Moone is
in 24. bou-
res 1 point

And thus much I haue sayde of the moones motion:
for that some seamen will take vpon them to correct the
Almanacks as touching the chaunge and quarters of the
Moone

The Regiment for the Sea. 14

Mone : holding this opinion, that every mone ought to be equall in the number of the daies and houres : and the full Moones to be iust the halfe contents . And the quarters in like manner, the iust fourth parte in dayes and houres , so that some of them will take vpon them to tell (by the rule of the Epact,) the true houre of the chaunge, quarters, and full full of the Mone Where in they are notably deceued.

& 11. Minutes asunder from the Sunne Error of Marriners

Againe, sometyne in the yere you shall see the mone rather then at some other time, as this for example.

From Iannuarie to Iune, you shall see the mone within foure and twentie houres after the change, because she hath North declination of the Sunne, and maketh a bigger Arch than the Sunne.

From Iuly to December, you shall not see the mone thre dayes after the chaunge, because hir declination is to the south part of the Sunne : but you may see hir in foure and twentie houres before hir chaunge. Now the sea-men doe imagine a Prime daye, which is the halfe quarter of the mone : that is, when the mone is thre dayes and eightene houres olde, (the mone being then 4. points to the eastward of the sunne, which is thre houres :) the same rule may they in like case obserue when the mone is past the full thre dayes and eightene houres, and also in the middes of the quarters.

Heere foloweth a Table of Tides.

First, the Mone South or North, on Landes ende full sea.

The Mone South and by East, at the Coze ende full sea.

The mone south southwest, betwene holy Island and
D.ii. Tines

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Tinemouth, full sea.

It floweth betwene Tinemouth & Flambrough head, southwest and Northeast mone.

It floweth betwene Flambrough head, and Bridlington in the Bay, a southwest and by west mone.

The Mone in the west southwest, betwene Bridlington and Laurenas, full sea.

It floweth betwene Laurenas and Cromer all along the well: an East and west mone.

It floweth betwene Cromer and Parnmouth Kode, to Laystow Porth Kode, a southeast mone.

It floweth betwene Laystow Kode and Dyzdenas, a southeast and by south mone.

It floweth betwene Dyzd & Dzelwel waues, a south southeast mone.

It floweth betwene the Pas and the Warehead of Colne, a south and by East mone.

It floweth at the Spittes, and at the Shetue, and all alongst the Swinne, a south mone.

At the west ende of the Pore, a south & by west mone, full sea.

It floweth at Grauesend, a south southwest mone.

It floweth at London brydge, a southwest mone.

It floweth at the Porth Fozlande, a south southeast mone, & so alongst the coast till you come to Bechey. And in the Offing from the Porth Fozland to the south Fozland, it runneth halfe tyde. And from the southfozland to the Pas, the tyde runneth halfe tyde halfe quarter. And from the Pas to Fairely, it runneth halfe tide: and from Fairely to Beche, it runneth quarter tyde vnder other.

It floweth to the Westward of Beche, a kenning, a southeast and by south mone.

It floweth at Portesmouth, a south and by East mone.

It floweth at S. Glens a south southeast mone.

It

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It floweth on the sea side of the Island, a southeast and by south moone: and so on the land, and at the Needles, and runneth quarter tide in the Offing.

It floweth at Poole in the haven: a southeast moone.

It floweth at Weymouth: an East and west moone.

It floweth at Portland: a southeast moone.

It floweth from y^e west part of Portland, till you come vnto Blimmouth, an East and West moone.

It floweth on the Shore from Blimmouth to the Lizard: a west and by south moone. And in the Offing a southeast moone.

It floweth at Pounts Baye: an East and West moone.

It floweth at Selly: a West and by south moone.

It floweth at the Landes end of Golfe: a West south west moone.

It floweth all alongst the coast vnto Bristol, and the coast of Ireland, from Waterford to Kinsale, a west and by south moone.

Furthermore it floweth (for the most part) from the Poll head of Burdeau: all alongst the coast of Biske, Calysa, Portingale, till you come to the Straights of Maliga, a southwest and Southeast moone.

It floweth at Flushing, a southwest & by south moone.

It floweth at Antwerp, an East and west moone.

It floweth all alongst the coast of Flanders, from the Wildings to Calys, a south and by East moone: & so runneth halfe tide vnder the other.

Now here is one speciall thing to be noted, and that is this: It floweth one point of the Compasse more in the spring streames, then it doth in any of the quarters of the moone, (so that it be a River where there is any indraft, hauing distaunce from the Sea) when there is neither rage of windes, nor any cause either to hinder or further the said effect,

It wil flow
a point of
the com-
pas more
in y^e spring
tides than
in y^e neap

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rides in a
riuer that
hath any
distance
vnto y^e sea.

As for example, thus : It floweth at Grauesende at the chaunge of the Moone or full, a south south west moone. But in any of the quarters of the moone it scant floweth, a South and by West Moone : and this is generall for ever.

The fourth Chapter treateth of the Sunne & Moones course in the Zodiack : and how you shall know what houres the Moone shall rise and set at: and at what point of the Compass: with other necessary things.

To know
how long
the moone
shineth.

Furthermore, the Sunne (by his naturall moving thorough the twelue signes in the Zodiacke, in the yere) doeth cause the height and lownesse of his declination: which is necessarie for the seafaring men to know, the which declination they doe take from equinotiall to equinotiall: and this is to be noted, that as the sunne hath declination, so in like maner hath the moone, for by her declination and the sunne, is knowen the time of hir shining or abiding aboue our Horizon.

The sunne or moone in the first minute of Aries, doe rise East, and sette West, and shine twelue houres. In the first minute of Taurus, they rise neare the East North east, and sette neare the West South west, and shine somewhat more then 14. houres. In the signe of Gemini, they rise neare the North east and by East, and they set neare the South west and by West, and shine neare sixtene hours. In the signe of Cancer, the first minute, they make the greatest declination to the Northwards, and they rise neare the North east, and sette neare the South west, and shine neare 16. houres and a halfe. In the first minute of Leo, (descending towards the equinotiall) as they dyd in Gemini. And in the signe of Virgo, as they did in Tau-

rus.

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rus. And in the first minute of Libra, Equinoctiall : beginning south declination, as in Aries. And in the first minute of Scorpio, they rise néere the East southeast, and set néere the west southwest, and shine ten houres. In the first minute of Sagittarius, they rise néere the southeast & by east, and set neare the southwest and by west, and shine eight houres. In the first minute of Capricornus, they haue their greatest declination to the south, and begin to returne to the equinoctial, rising néere the southeast, and setting néere the southwest, and shine seuen houres & a halfe. In the first minute of Aquarius, as in Sagittarius. In the first minute of Pisces, as in Scorpio.

Now by this rule you may know the rising and setting of the moone for euer, as thus. I haue shewed you befoze in the shifting of the sunne and moone, for that every day of the age of the moone, the moone goeth Eastward one point and thre minutes : in two dayes two points and six minutes, &c.

To know
what hou-
re or poin-
t
y Moone
ryseth or
setteth.

Now when you list to know the very houre and time of hir rising : Looke how many dayes the moone is old, then put so many points and so many 3 minuts, & looke what it amounteth vnto . But oz euer I say any moze in those matters, héere is one speciall thing to be noted, that is, when that the moone doth change, and then the moone & sunne be both vnder one like degré & minute of any signe of the Zodiack. The full moone is when y sunne and the moone be opposite (the one being directly against y other & iust 6 signes asunder) as you may perceiue at the full moone: for then when the moone riseth, y sunne setteth: & when the sunne riseth the moone setteth. The quarters be when the sunne & moone be iust 3 signes asunder (that is, iust 90 degrés.) Now when you list to know y very time of the moones rising oz setting, looke in your Kalender, what signe and degré the moone is in: then according to that rule of y shining, diuide that into two equal parts then

Of the
change.

Of the ful
Moone.

Quarter
of the
Moone.

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Ensample
of the
Moones
rising and
setting.

then from the south, so shall you see at what houre the moone riseth, as for example thus. In March alwaies the sunne is in Aries, then the moone being in hir first quarter, is five houres to the Eastward of y sunne, then the moone must needes be in Cancer. Then shineth the Moone in our Horizon 16. houres and a halfe, and is south at five of the clock, and shineth 8. houres and a quarter after 6. of the clock. So that she setteth at 2. of the clock & a quarter of an houre past, and riseth in the day 8. houres and a quarter before 6. of the clock, that is, at 9. of the clock, & 3. quarters of an houre past. Now at the last quarter in March, then the moone must needes be in Capricornus, and shineth but 7. houres and a halfe, and is south at 6. of the clock in the morning, and riseth 3. houres and 3. quarters before, that is, at two of the clock & a quarter of an houre past in the morning, & she setteth by day at 9. of the clock, and 3. quarters of an houre past, and this rule will serue for euer, without any great error. But yet ther is a further matter for y exact doing, which is the latitude of the Moone from the head or taile of the Dragon.

The
Moone
hath La-
titude.

And now for to shew vnto you when that the moone is with the head and the taile of the Dragon, as I haue in the third Chapter said vnto you, there are but few seamen that doth know the moones Theozickes for they cannot tell when that the moone is in hir swift or slow motion. So in like maner it is necessarie for to know the moones Latitude from the lyne Ecliptick, & also of which side of the line Eclipticke, which is knowen by the head or taile of the Dragon. For when that the moone hath passed nintie degrees from the head of the Dragon, then the moone hath Latitude five degrees vnto the North parts of the lyne Ecliptick, and also if that the moone be 90. degrees from the Dragons taile, then the moone hath Latitude five degrees vnto the south parts of the line Ecliptick. So that the Dragons head is no other thing, but the cross-
sing

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ling or passing of the Moone from the south parts vnto the North part of the lyne Ecclypticke. So in like manner the Dragons taile is the crossing or passing of the Moone ouer the line Ecclypticke from the North part vnto the south parts of the line Ecclypticke. The effects here of is this, if the Moone doth come with the head or tayle of the Dragon at her opposition or full, then she shall be Eclipsed because the shadow of the earth is seene vpon the Moone, and these eclipses be generall thow the face of the whole earth, if that the Moone be aboue the Horizon. And in like manner, if that the Moone doth come with the head or tayle of the Dragon at the coniunction or chaunge of the Moone, then the sunne is eclipsed, for that the Moone commeth betwene the sunne and the earth, but these Eclipses are not generall, for that the Deameter of the earth is more then five times the Deameter of the moone: and also the moone commeth verie nere vnto the earth in respect of the great distance that the Sunne is from the Earth, so that the Sunne may be Eclipsed in one place but not in another, which doth happen by the Moones Paralex, as afoze I haue shewed &c. And now for to know where the Dragons head is, note this, when that the Prime is one, then the Dragons head is in the first part of Aries, as the point of Auge is. But their motions are contrarie: for sa y point of Auge is in Aries, & from thence commeth into Taurus, and so successively proceedeth through the xii. signes in 19 yeeres. So the Dragons head doth passe through the 12. signes in 19. yeeres backwards, for being in Aries, it commeth into Pisces, and thence into Aquarius, &c. So that in 9. yeeres and a halfe, the Dragons head is in Libra, and doth mate with the point of Auge, &c.

And now for to know the Moones Latitude, marke this, the Prime one, the Dragons head is in Aries, wherby it may be inferred that the Moone in Cancer, is 90.

C.

Degrés

The Regiment for the Sea.

Degrées from the Dragons head , and hath her farthest distance from the line Eclipticke, that is five degrées. So that the Moone doth decline five Degrées more vnto the Northwardes than the sunne doth , and her whole declination is twentie 8. Degrées and a halfe from the Equinotiall, as touching the Dragons tayle which is alwaies opposite vnto the Dragons head, the Prime being one, the Dragons tayle is in Libra. Item the Moone passing Cancer, commeth nearer the Eclipticke, and in Libra, she crosseth the line Eclipticke, and when she is come into Capricorne, then she is five degrées vnto the southwardes of the line Eclipticke , and declineth twentie 8 Degrées and a halfe vnto the southwardes of the Equinotiall . So that the Moone doth decline in all, (medling not with the Moones Parallare) 57. degrées , the Prime being one, in nine yéres & a halfe, the Dragons head shall be in Libra, and the tayle in Aries, & then the moone in y signe of Libra , shall passe ouer the line Eclipticke from the south part to the North part . So that the Moone in the signe of Capricorne, is five degrées vnto the North of the line Eclipticke, and then she doth decline but xviii. degrées and a halfe from the Equinotiall to the south partes, and so in the signe of Aries, the moone shall passe ouer the line Eclipticke from the North vnto the south and then in Cancer , the moone is five degrées vnto the south of the line Eclipticke , and doth decline xviii. Degrées vnto the North parts of the Equinotiall, so that the moones whole declination, is but 37. Degrées . So when the Prime is one , the declination of the moone is more by xx . Degrées, then when the Prime is betwene nine and tenne yéres, and when the Prime is neare five, then the Dragons head is in Capricornus. And when the Prime is foure, téne or fifténe , the Dragons head is in Cancer . So that in xix . yéres the Dragons head doth passe through the twelue signes backwardes.

Thus

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Thus by knowing what the Prime is, you may knowe where the Dragons head is, and also the Dragons tayle, & then that knowen, you may knowe the moones Latitude from the line Eclipticke, and of which side: For when the moone is in the Dragons head, then she passeth ouer from the south vnto the North part, but when she is with the Dragons tayle then she passeth ouer from the North vnto the south part of the line Eclipticke, and then when that the Moone is halfe way betwene the head and the tayle of the Dragon, then is she five degrées in latitude from the line eclipticke, y is to say, if that she come from the head of the Dragon, she is 5. degrées on the North side, if from the taile, then is she 5. degrées on the south side of the line Eclipticke, and this I doe thinke sufficient for instruction. Heere (as befoze) I could wish that seafaring men or others would not leane too much vnto these rules of the Prime concerning the finding out of the true place of the Dragons head or taile because they are vncertaine, but I would wish them to sticke vnto the Ephemerides, wherein to saue their labour these thinges are seuerally set downe with more certentie.

Yet there is one thing which I would sea-faring men should consider, although a great number be expert in that, yet it is meete to be spoken of, as this. The sunne being in Cancer, or Moone in like manner, or in Gemini, or any time when the sunne or moone hath North declination, they will set their Compasse befoze them, and when they see the sun giue an East shadow, they will say y it is five of the clocke, whereas if the sunne be in Cancer, it is not much past five of the clocke and the farther they are to the southwards, y more they do erre. And in like case y Moone being in Cancer, when they do see y Moone giue an east shadow by their compasse, they will say y moone is West, but they do not consider, y the sun & y moone being in Cancer, cometh so neare our Zenith or verticall point right ouer

You can not know what a clocke it is by the compasse, the Sun being in the North signes.

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Error of our head, (which is the verie height of their declination)
ſ shadow that the position of their shadow can hardly be discerned,
of the therefore they must iudge the East or West from the pole
Moone. or North starre, if they will iudge truely.

The equi- Wherefore I doe much commend the Equinoctiall
noctiall dyalls for the exact truth, for they cannot know the truth
dyalls be by their Compasse, if that the Sunne or moone, or anie
very good other starre, haue any great declination, being in Cancer:
 and you must consider this in like manner. The Sunne
 hauing North declination, the further you doe goe to the
 Northwardes, the longer is your day, and the shorter is
 your night, & towards the southwardes, the shorter dayes
 and longer nights.

As touch- Now contrariwise, the sunne hauing south declinati-
ing the on, the more to the Northwardes, the shorter dayes and
length & the longer nights, the further to the southwardes, the
shortnesse longer dayes and shorter nights, and vnder the Equinocti-
of the day all, the nightes and dayes all one, what declination so
and night. euer the sunne hath: but this rule that I haue giuen you
 is for London, or any other place that hath North Latit-
 tude or the eleuation of the Pole Arcticke.

¶ The fift Chapter is of a Table of declination,
 commonly called of Sea-faring men, A Re-
 giment of the Sunne, exactly calculated
 for foure yeeres, and will serue for
 24, yeeres, for euerie day
 of the moneth.



And in like manner as I haue saide some-
 what of the Moones motion, so I do thinke
 it conuenient for to say somewhat of the
 Sunnes motion, for that it is necessarie
 for Sea-men for to knowe, the Sunnes
 place in the Zodiacke, whereby that they
 may

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may calculate or count the sunnes declination truely, and as I haue shewed before, that the sunne doth passe thorough the Zodiacke in 365. dayes. 5 houres. 55 minutes, 13 seconds, and hath three motions as the moone hath. In the point of Auge is the sunnes slow motion, and then the Sunne passeth or goeth but little more than lviij. minutes in twentie 4. houres, and in the opposition of Auge, the sunne passeth or goeth one degree and nere 2 minutes in 24 houres, that is more by nere five minutes in his swift motion than in the sunnes slow motion. The point of Auge is now in this age of the worlde in the signe of Cancer, but not in the solstitiall point, where that y sunne hath his greatest declination, and also the opposition of Auge is in Capricorne, but not ther where the sunne hath his greatest declination. Now by the meanes of the three motions of the sunne, it falleth out that the Equinotiall points be not euen, for that there are more dayes from the Equinotiall of March, vnto the Equinotiall of September, by nere nine dayes, then that there is from the Equinotiall of September, vnto the Equinotiall of March, for that there is from the eleuenth day of March vnto the 14. day of September. 187 dayes, and there is but 178 dayes from the 14. day of September, vnto the 11 day of March. And the reason is this as I haue saide before, because that in the latter part of June the Sunne is in his slowe motion, and also in the latter part of December, he is in his swift motion: and this I doe thincke sufficient for instructions in this matter, for that the sea-men hath no farther to doe with the sunnes motion, but onelie from the true place of the sunne to seeke the true declination of it. And also the most part of sea-men haue vsed Spanish Regiments, and thinking that those would haue serued for euer, which is most contrarie, for if that it be neuer so truely calculated, yet it groweth after twentie foure yere vnto error.

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For as often as euerie yere of Bissextilis doth come about, which is euerie foure yere, the sunne is sooner in the Equinotiall by more then halfe an houre, &c.

Euerie person can not calculate the Suns declination.

Two times in the yere the Sunne hath declination.
1577.

Now shall follow a Table of declination of Regiment for foure yeres, being calculated for England, and will serue all Europe without much error, or any other countrie or place that hath our Longitude, as the most part of Africa, Ginie, and those partes to the southwardes, as farre as the Antarticke Pole seruing for euerie day of the moneth, verie necessarie for them that doe vse to trauaile either by sea or by land, and is one of the principall points in Nauigation, for long voyages, & the cause why I haue written this Regiment for y sea, or Tables of declination, is for that I doe know that euerie parson that goeth vnto the sea, as master of a shippe, hath not capacitie to calculate the sunnes declination, by the place of y Sun, although they haue the Tables of declination, as the Ephemerides, or Martine Curteise, otherwise called the Art of Nauigation. Wherefore I haue written these notes, and Regiment or Table of declination for foure yeres, & the first row towards your left hand, is the dayes of the moneth: the next row is the degrees of declination that the Sunne hath at the instant time of noone: and the third row is the odde minutes of declination belonging to the degrees.

Now there be two times in the yere that the Sunne hath no declination, as this. For the first yere after Bissextilis, (which is in the yere of our lord 1593. the 11 day of March, at five of the clocke in the morning (the sunne was in the Equinotiall beginning North declination. And in like manner the 13. day of September betwene 10 and 11 a clocke, the sunne wilbe in the equinotiall beginning south declination, and also the second yere after Bissextilis, which is the yere of our Lord 1594. the sunne is in the Equinotiall 11 day of March, betwene 8 and 9.

of

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of the clocke befoze noone, beginning North declination, and in like manner the 13 day of September, betwæne 2 and 3 of the clocke in the after noone, beginning south declination.

Furthermoze, in the third yære after Bissextrilis which is the yære of our Lord 1595. the sunne is in the Equi- noctiall the 11. day of March, betwæne two and 3 of the clocke in the after noone, beginning North declination, & so in like manner the 13 day of September betwæne 8 and 9 of the clocke at night, beginning south declination.

Lastlie, in the yære of our Lord. 1596. that is, y yære Bissextrilis it selfe. Uppon the 10 day of March, the sunne shall be in the Equinoctiall betwæne 11 and 12 of the clocke at night, beginning North declination: and in like manner the 13 day of September, betwæne 1 and 2 of the clocke in the moorning, beginning south declination: Now these foure yæres being expired, you must after the yære Bissextrilis, begin againe at the yære one: as hære doth folloiw, for example. And so it will serue for næere twentie yæres to come.

| Yeere 1 | Yeere 2 | Yeere 3 | Yeere Bissextrilis |
|------------|------------|------------|-----------------------|
| 1593 | 1594 | 1595 | 1596 |
| 1597 | 1598 | 1599 | 1600 |
| 1601 | 1602 | 1603 | 1604 |
| 1605 | 1606 | 1607 | 1608 |
| 1609 | 1610 | 1611 | 1612 |

1593 The first yeare after the Leape yeere, 1

| Iuanuarie | | | Februarie | | | March | | |
|-----------|----|----|-----------|----|----|----------|---|----|
| D. G. M. | | | D. G. M. | | | D. G. M. | | |
| 1 | 21 | 50 | 1 | 14 | 4 | 1 | 3 | 47 |
| 2 | 21 | 41 | 2 | 13 | 44 | 2 | 3 | 24 |
| 3 | 21 | 31 | 3 | 13 | 24 | 3 | 3 | 00 |
| 4 | 21 | 20 | 4 | 13 | 4 | 4 | 2 | 36 |
| 5 | 21 | 9 | 5 | 12 | 43 | 5 | 2 | 13 |
| 6 | 20 | 58 | 6 | 12 | 23 | 6 | 1 | 49 |
| 7 | 20 | 47 | 7 | 12 | 2 | 7 | 1 | 26 |
| 8 | 20 | 35 | 8 | 11 | 41 | 8 | 1 | 2 |
| 9 | 20 | 22 | 9 | 11 | 20 | 9 | 0 | 39 |
| 10 | 20 | 9 | 10 | 10 | 58 | 10 | 0 | 15 |
| 11 | 19 | 50 | 11 | 10 | 36 | 11 | 0 | 8 |
| 12 | 19 | 43 | 12 | 10 | 15 | 12 | 0 | 32 |
| 13 | 19 | 29 | 13 | 9 | 53 | 13 | 0 | 56 |
| 14 | 19 | 14 | 14 | 9 | 31 | 14 | 1 | 19 |
| 15 | 19 | 00 | 15 | 9 | 9 | 15 | 1 | 43 |
| 16 | 18 | 45 | 16 | 8 | 47 | 16 | 2 | 6 |
| 17 | 18 | 30 | 17 | 8 | 24 | 17 | 2 | 30 |
| 18 | 18 | 14 | 18 | 8 | 2 | 18 | 3 | 53 |
| 19 | 17 | 58 | 19 | 7 | 39 | 19 | 3 | 17 |
| 20 | 17 | 42 | 20 | 7 | 16 | 20 | 4 | 40 |
| 21 | 17 | 25 | 21 | 6 | 53 | 21 | 4 | 3 |
| 22 | 17 | 8 | 22 | 6 | 30 | 22 | 4 | 26 |
| 23 | 16 | 51 | 23 | 6 | 7 | 23 | 5 | 49 |
| 24 | 16 | 33 | 24 | 5 | 44 | 24 | 5 | 12 |
| 25 | 16 | 16 | 25 | 5 | 21 | 25 | 5 | 35 |
| 26 | 15 | 58 | 26 | 4 | 58 | 26 | 6 | 58 |
| 27 | 15 | 39 | 27 | 4 | 34 | 27 | 6 | 21 |
| 28 | 15 | 19 | 28 | 4 | 10 | 28 | 7 | 43 |
| 29 | 15 | 2 | | | | 29 | 7 | 6 |
| 30 | 14 | 43 | | | | 30 | 7 | 29 |
| 31 | 14 | 24 | | | | 31 | 7 | 51 |

South Declination.

Sunne in the Equinoctiall.

North Declination.

F.

1593. The first yeere after the Leape yeere.

| April. M D. G. M. | | | May. M D. G. M. | | | June. M D. G. M. | | |
|----------------------|----|----|--------------------|----|----|---------------------|----|----|
| 1 | 8 | 13 | 1 | 17 | 49 | 1 | 23 | 5 |
| 2 | 8 | 41 | 2 | 18 | 4 | 2 | 23 | 9 |
| 3 | 8 | 57 | 3 | 19 | 19 | 3 | 23 | 13 |
| 4 | 9 | 19 | 4 | 18 | 35 | 4 | 23 | 16 |
| 5 | 9 | 40 | 5 | 18 | 49 | 5 | 23 | 19 |
| 6 | 10 | 2 | 6 | 19 | 3 | 6 | 23 | 22 |
| 7 | 10 | 23 | 7 | 19 | 16 | 7 | 23 | 24 |
| 8 | 10 | 44 | 8 | 19 | 30 | 8 | 23 | 25 |
| 9 | 11 | 4 | 9 | 19 | 43 | 9 | 23 | 26 |
| 10 | 11 | 25 | 10 | 19 | 56 | 10 | 23 | 27 |
| 11 | 11 | 45 | 11 | 20 | 9 | 11 | 23 | 28 |
| 12 | 12 | 5 | 12 | 20 | 21 | 12 | 23 | 28 |
| 13 | 12 | 26 | 13 | 20 | 33 | 13 | 23 | 27 |
| 14 | 12 | 46 | 14 | 20 | 44 | 14 | 23 | 26 |
| 15 | 13 | 6 | 15 | 20 | 55 | 15 | 23 | 25 |
| 16 | 13 | 25 | 16 | 21 | 6 | 16 | 23 | 24 |
| 17 | 13 | 44 | 17 | 21 | 16 | 17 | 23 | 22 |
| 18 | 14 | 3 | 18 | 21 | 26 | 18 | 23 | 19 |
| 19 | 14 | 22 | 19 | 21 | 36 | 19 | 23 | 16 |
| 20 | 14 | 41 | 20 | 21 | 45 | 20 | 23 | 13 |
| 21 | 14 | 59 | 21 | 21 | 54 | 21 | 23 | 9 |
| 22 | 15 | 17 | 22 | 22 | 2 | 22 | 23 | 5 |
| 23 | 15 | 35 | 23 | 22 | 10 | 23 | 23 | 1 |
| 24 | 15 | 53 | 24 | 22 | 18 | 24 | 22 | 56 |
| 25 | 16 | 10 | 25 | 22 | 25 | 25 | 22 | 51 |
| 26 | 16 | 27 | 26 | 22 | 32 | 26 | 22 | 45 |
| 27 | 16 | 43 | 27 | 22 | 39 | 27 | 22 | 39 |
| 28 | 17 | 1 | 28 | 22 | 45 | 28 | 22 | 32 |
| 29 | 17 | 17 | 29 | 22 | 50 | 29 | 22 | 25 |
| 30 | 17 | 33 | 30 | 22 | 56 | 30 | 22 | 18 |
| 31 | 17 | 48 | 31 | 23 | 1 | | | |

North Declination

Declination

North

Solstice

Declination

Declination

1593. The first yeere after the Leape yeere.

| July. D.G.M. | | | August. D. G. M. | | | September. D./G/ M. | | |
|-----------------|----|----|---------------------|----|----|------------------------|---|----|
| 1 | 22 | 10 | 1 | 15 | 21 | 1 | 4 | 38 |
| 2 | 22 | 2 | 2 | 15 | 3 | 2 | 4 | 14 |
| 3 | 21 | 54 | 3 | 14 | 45 | 3 | 3 | 51 |
| 4 | 21 | 45 | 4 | 14 | 27 | 4 | 3 | 28 |
| 5 | 21 | 34 | 5 | 14 | 8 | 5 | 3 | 5 |
| 6 | 21 | 26 | 6 | 13 | 49 | 6 | 2 | 42 |
| 7 | 21 | 16 | 7 | 13 | 30 | 7 | 2 | 18 |
| 8 | 21 | 9 | 8 | 13 | 11 | 8 | 1 | 55 |
| 9 | 20 | 55 | 9 | 12 | 15 | 9 | 1 | 31 |
| 10 | 20 | 44 | 10 | 12 | 31 | 10 | 1 | 8 |
| 11 | 20 | 33 | 11 | 12 | 12 | 11 | 0 | 45 |
| 12 | 20 | 21 | 12 | 11 | 52 | 12 | 0 | 22 |
| 13 | 20 | 9 | 13 | 11 | 32 | 13 | 0 | 1 |
| 14 | 19 | 57 | 14 | 11 | 11 | 14 | 0 | 25 |
| 15 | 19 | 44 | 15 | 10 | 51 | 15 | 0 | 47 |
| 16 | 19 | 31 | 16 | 10 | 30 | 16 | 1 | 11 |
| 17 | 19 | 17 | 17 | 10 | 9 | 17 | 1 | 39 |
| 18 | 19 | 4 | 18 | 9 | 48 | 18 | 1 | 58 |
| 19 | 18 | 50 | 19 | 9 | 27 | 19 | 2 | 11 |
| 20 | 18 | 39 | 20 | 9 | 5 | 20 | 2 | 45 |
| 21 | 18 | 21 | 21 | 8 | 44 | 21 | 3 | 9 |
| 22 | 18 | 6 | 22 | 8 | 22 | 22 | 3 | 30 |
| 23 | 17 | 51 | 23 | 8 | 00 | 23 | 3 | 55 |
| 24 | 17 | 35 | 24 | 7 | 38 | 24 | 4 | 18 |
| 25 | 17 | 19 | 25 | 7 | 16 | 25 | 4 | 40 |
| 26 | 17 | 3 | 26 | 6 | 53 | 26 | 5 | 5 |
| 27 | 16 | 47 | 27 | 6 | 31 | 27 | 5 | 26 |
| 28 | 16 | 30 | 28 | 6 | 9 | 28 | 5 | 51 |
| 29 | 16 | 13 | 29 | 5 | 46 | 29 | 6 | 16 |
| 30 | 15 | 56 | 30 | 5 | 24 | 30 | 6 | 36 |
| 31 | 15 | 39 | 31 | 5 | 1 | | | |

North Declination.

San in the Equi noctiall.

South

Declination.

F. 11.

1593. The first year after the Leape year.

| October D. G. M. | | November D. G. M. | | December D. G. M. |
|---------------------|--|----------------------|--|----------------------|
| 1 6 59 | | 1 17 25 | | 1 23 1 |
| 2 7 22 | | 2 17 42 | | 2 23 5 |
| 3 7 44 | | 3 17 58 | | 3 23 10 |
| 4 8 7 | | 4 18 13 | | 4 23 14 |
| 5 8 29 | | 5 18 29 | | 5 23 17 |
| 6 8 52 | | 6 18 44 | | 6 23 20 |
| 7 9 13 | | 7 18 59 | | 7 23 25 |
| 8 9 35 | | 8 19 14 | | 8 23 24 |
| 9 9 57 | | 9 19 28 | | 9 23 26 |
| 10 10 19 | | 10 19 41 | | 10 23 27 |
| 11 10 41 | | 11 19 54 | | 11 23 28 |
| 12 11 1 | | 12 20 7 | | 12 23 28 |
| 13 11 24 | | 13 20 21 | | 13 23 28 |
| 14 11 44 | | 14 20 33 | | 14 23 27 |
| 15 12 5 | | 15 20 45 | | 15 23 25 |
| 16 12 26 | | 16 20 56 | | 16 23 24 |
| 17 12 47 | | 17 21 7 | | 17 23 21 |
| 18 13 6 | | 18 21 19 | | 18 23 19 |
| 19 13 26 | | 19 21 29 | | 19 23 16 |
| 20 13 46 | | 20 21 39 | | 20 23 12 |
| 21 14 6 | | 21 21 48 | | 21 23 8 |
| 22 14 26 | | 22 21 57 | | 22 23 3 |
| 23 14 44 | | 23 22 7 | | 23 22 58 |
| 24 15 3 | | 24 22 15 | | 24 22 53 |
| 25 15 23 | | 25 22 23 | | 25 22 47 |
| 26 15 30 | | 26 22 30 | | 26 22 40 |
| 27 15 48 | | 27 22 37 | | 27 22 33 |
| 28 16 17 | | 28 22 44 | | 28 22 26 |
| 29 16 34 | | 29 22 50 | | 29 22 18 |
| 30 16 42 | | 30 22 56 | | 30 22 10 |
| 31 17 9 | | | | 31 22 1 |

North
Declination

South

Solstice.

Declination.

Declination.

1594. The second yeere after the Leape yeere.

| Ianuarie. D. G. M. | | | Februarie. D. G. M. | | | March. D. G. M. | | |
|-----------------------|----|----|------------------------|----|----|--------------------|---|----|
| 1 | 21 | 52 | 1 | 14 | 10 | 1 | 3 | 53 |
| 2 | 21 | 43 | 2 | 13 | 50 | 2 | 3 | 29 |
| 3 | 21 | 33 | 3 | 13 | 30 | 3 | 3 | 5 |
| 4 | 21 | 23 | 4 | 13 | 9 | 4 | 2 | 43 |
| 5 | 21 | 13 | 5 | 12 | 49 | 5 | 2 | 19 |
| 6 | 21 | 1 | 6 | 12 | 29 | 6 | 5 | 55 |
| 7 | 20 | 50 | 7 | 12 | 8 | 7 | 1 | 31 |
| 8 | 20 | 39 | 8 | 11 | 47 | 8 | 1 | 7 |
| 9 | 20 | 25 | 9 | 11 | 26 | 9 | 0 | 43 |
| 10 | 20 | 13 | 10 | 11 | 4 | 10 | 0 | 20 |
| 11 | 20 | 00 | 11 | 10 | 43 | 11 | 0 | 4 |
| 12 | 19 | 47 | 12 | 10 | 21 | 12 | 0 | 27 |
| 13 | 19 | 33 | 13 | 9 | 59 | 13 | 0 | 51 |
| 14 | 19 | 19 | 14 | 9 | 37 | 14 | 1 | 14 |
| 15 | 19 | 4 | 15 | 9 | 15 | 15 | 1 | 37 |
| 16 | 18 | 59 | 16 | 8 | 53 | 16 | 2 | 1 |
| 17 | 18 | 33 | 17 | 8 | 30 | 17 | 2 | 24 |
| 18 | 18 | 20 | 18 | 8 | 8 | 18 | 2 | 48 |
| 19 | 18 | 3 | 19 | 7 | 46 | 19 | 3 | 11 |
| 20 | 17 | 56 | 20 | 7 | 23 | 20 | 3 | 34 |
| 21 | 17 | 31 | 21 | 7 | 00 | 21 | 3 | 57 |
| 22 | 17 | 13 | 22 | 6 | 37 | 22 | 4 | 21 |
| 23 | 16 | 56 | 23 | 6 | 13 | 23 | 4 | 47 |
| 24 | 16 | 39 | 24 | 5 | 30 | 24 | 5 | 7 |
| 25 | 16 | 21 | 25 | 5 | 27 | 25 | 5 | 30 |
| 26 | 16 | 4 | 26 | 5 | 3 | 26 | 5 | 53 |
| 27 | 15 | 45 | 27 | 4 | 40 | 27 | 6 | 15 |
| 28 | 15 | 26 | 28 | 4 | 17 | 28 | 6 | 38 |
| 29 | 15 | 8 | | | | 29 | 7 | 1 |
| 30 | 14 | 49 | | | | 30 | 7 | 23 |
| 31 | 14 | 29 | | | | 31 | 7 | 46 |

South

Declination.

South Declination.

Sun in
the Equi-
noctall.

North

Declination.

F.ij.

1594. The second yeere after the Leape yeare.

| Aprill. D. G. M. | | | May. D.G.M. | | | Iune. D. G. M. | | |
|---------------------|----|----|----------------|----|----|-------------------|----|----|
| 1 | 8 | 8 | 1 | 17 | 45 | 1 | 23 | 4 |
| 2 | 8 | 30 | 2 | 18 | 1 | 2 | 23 | 8 |
| 3 | 8 | 52 | 3 | 18 | 16 | 3 | 23 | 12 |
| 4 | 9 | 14 | 4 | 18 | 31 | 4 | 23 | 16 |
| 5 | 9 | 36 | 5 | 18 | 45 | 5 | 23 | 19 |
| 6 | 9 | 37 | 6 | 19 | 0 | 6 | 23 | 21 |
| 7 | 10 | 18 | 7 | 19 | 13 | 7 | 23 | 23 |
| 8 | 10 | 40 | 8 | 19 | 27 | 8 | 23 | 25 |
| 9 | 11 | 0 | 9 | 19 | 40 | 9 | 23 | 27 |
| 10 | 11 | 21 | 10 | 19 | 53 | 10 | 23 | 27 |
| 11 | 11 | 42 | 11 | 20 | 5 | 11 | 23 | 28 |
| 12 | 12 | 2 | 12 | 20 | 18 | 12 | 23 | 28 |
| 13 | 12 | 23 | 13 | 20 | 30 | 13 | 23 | 28 |
| 14 | 12 | 29 | 14 | 20 | 41 | 14 | 23 | 27 |
| 15 | 13 | 3 | 15 | 20 | 53 | 15 | 23 | 26 |
| 16 | 13 | 23 | 16 | 21 | 45 | 16 | 23 | 24 |
| 17 | 13 | 42 | 17 | 21 | 14 | 17 | 23 | 22 |
| 18 | 14 | 2 | 18 | 21 | 24 | 18 | 23 | 20 |
| 19 | 14 | 20 | 19 | 21 | 34 | 19 | 23 | 17 |
| 20 | 14 | 38 | 20 | 21 | 43 | 20 | 23 | 15 |
| 21 | 14 | 57 | 21 | 21 | 52 | 21 | 23 | 10 |
| 22 | 15 | 15 | 22 | 22 | 0 | 22 | 23 | 6 |
| 23 | 15 | 32 | 23 | 22 | 8 | 23 | 23 | 2 |
| 24 | 15 | 50 | 24 | 22 | 16 | 24 | 22 | 57 |
| 25 | 16 | 8 | 25 | 22 | 24 | 25 | 22 | 54 |
| 26 | 16 | 25 | 26 | 22 | 31 | 26 | 22 | 46 |
| 27 | 16 | 42 | 27 | 22 | 37 | 27 | 22 | 40 |
| 28 | 16 | 58 | 28 | 22 | 43 | 28 | 22 | 34 |
| 29 | 17 | 14 | 29 | 22 | 49 | 29 | 22 | 26 |
| 30 | 17 | 30 | 30 | 22 | 54 | 30 | 22 | 20 |
| | | | 31 | 23 | 00 | | | |

North

North

Solstice.

Declination.

Declination.

1594 The second yeere after the Leape yeare.

July
D. G. M.

August
D. G. M.

September.
D. G. M.

| | | |
|----|----|----|
| 1 | 22 | 12 |
| 2 | 22 | 4 |
| 3 | 21 | 36 |
| 4 | 21 | 47 |
| 5 | 21 | 38 |
| 6 | 21 | 29 |
| 7 | 21 | 19 |
| 8 | 21 | 8 |
| 9 | 20 | 58 |
| 10 | 20 | 47 |
| 11 | 20 | 36 |
| 12 | 20 | 24 |
| 13 | 20 | 12 |
| 14 | 20 | 0 |
| 15 | 19 | 47 |
| 16 | 19 | 34 |
| 17 | 19 | 20 |
| 18 | 19 | 7 |
| 19 | 18 | 52 |
| 20 | 18 | 38 |
| 21 | 18 | 25 |
| 22 | 18 | 9 |
| 23 | 17 | 54 |
| 24 | 17 | 39 |
| 25 | 17 | 22 |
| 26 | 17 | 7 |
| 27 | 16 | 50 |
| 28 | 16 | 34 |
| 29 | 16 | 17 |
| 30 | 16 | 1 |
| 31 | 15 | 42 |

North

Declination.

| | | |
|----|----|----|
| 1 | 15 | 25 |
| 2 | 15 | 8 |
| 3 | 14 | 50 |
| 4 | 14 | 31 |
| 5 | 14 | 12 |
| 6 | 13 | 54 |
| 7 | 13 | 34 |
| 8 | 13 | 15 |
| 9 | 12 | 56 |
| 10 | 12 | 36 |
| 11 | 12 | 17 |
| 12 | 11 | 57 |
| 13 | 11 | 37 |
| 14 | 11 | 16 |
| 15 | 10 | 57 |
| 16 | 10 | 34 |
| 17 | 10 | 14 |
| 18 | 9 | 53 |
| 19 | 9 | 32 |
| 20 | 9 | 10 |
| 21 | 8 | 49 |
| 22 | 8 | 28 |
| 23 | 8 | 6 |
| 24 | 7 | 44 |
| 25 | 7 | 22 |
| 26 | 7 | 0 |
| 27 | 6 | 39 |
| 28 | 6 | 14 |
| 29 | 5 | 52 |
| 30 | 5 | 29 |
| 31 | 5 | 6 |

North Declination.

Sun in
the Equi-
noctall.

South

Declination.

| | | |
|----|---|----|
| 1 | 4 | 43 |
| 2 | 4 | 19 |
| 3 | 3 | 57 |
| 4 | 3 | 33 |
| 5 | 3 | 10 |
| 6 | 2 | 47 |
| 7 | 2 | 23 |
| 8 | 2 | 0 |
| 9 | 1 | 37 |
| 10 | 1 | 13 |
| 11 | 0 | 49 |
| 12 | 0 | 26 |
| 13 | 0 | 3 |
| 14 | 0 | 20 |
| 15 | 0 | 44 |
| 16 | 1 | 7 |
| 17 | 1 | 30 |
| 18 | 1 | 54 |
| 19 | 2 | 17 |
| 20 | 2 | 41 |
| 21 | 3 | 4 |
| 22 | 3 | 27 |
| 23 | 3 | 51 |
| 24 | 4 | 14 |
| 25 | 4 | 37 |
| 26 | 5 | 0 |
| 27 | 5 | 23 |
| 28 | 5 | 47 |
| 29 | 6 | 9 |
| 30 | 6 | 32 |

F.iii.

1594 The second yeere after the Leape yeare;

| October D. G. M. | | | November D. G. M. | | | December. D. G. M. | | |
|---------------------|----|----|----------------------|----|----|-----------------------|----|----|
| 1 | 6 | 54 | 1 | 17 | 21 | 1 | 23 | 0 |
| 2 | 7 | 16 | 2 | 17 | 37 | 2 | 23 | 5 |
| 3 | 7 | 39 | 3 | 17 | 54 | 3 | 23 | 9 |
| 4 | 8 | 1 | 4 | 18 | 9 | 4 | 23 | 12 |
| 5 | 8 | 23 | 5 | 18 | 25 | 5 | 23 | 16 |
| 6 | 8 | 46 | 6 | 18 | 40 | 6 | 23 | 19 |
| 7 | 9 | 8 | 7 | 18 | 54 | 7 | 23 | 21 |
| 8 | 9 | 29 | 8 | 19 | 9 | 8 | 23 | 23 |
| 9 | 9 | 51 | 9 | 19 | 24 | 9 | 23 | 26 |
| 10 | 10 | 13 | 10 | 19 | 37 | 10 | 23 | 27 |
| 11 | 10 | 35 | 11 | 19 | 51 | 11 | 23 | 28 |
| 12 | 10 | 56 | 12 | 20 | 4 | 12 | 23 | 28 |
| 13 | 11 | 17 | 13 | 20 | 17 | 13 | 23 | 28 |
| 14 | 11 | 38 | 14 | 20 | 30 | 14 | 23 | 27 |
| 15 | 11 | 59 | 15 | 20 | 42 | 15 | 23 | 26 |
| 16 | 12 | 20 | 16 | 20 | 53 | 16 | 23 | 24 |
| 17 | 12 | 41 | 17 | 21 | 4 | 17 | 23 | 22 |
| 18 | 13 | 11 | 18 | 21 | 16 | 18 | 23 | 20 |
| 19 | 13 | 21 | 19 | 21 | 26 | 19 | 23 | 17 |
| 20 | 13 | 41 | 20 | 21 | 36 | 20 | 23 | 13 |
| 21 | 14 | 1 | 21 | 21 | 46 | 21 | 23 | 9 |
| 22 | 14 | 20 | 22 | 21 | 55 | 22 | 23 | 4 |
| 23 | 14 | 39 | 23 | 22 | 4 | 23 | 23 | 0 |
| 24 | 14 | 58 | 24 | 22 | 13 | 24 | 22 | 55 |
| 25 | 15 | 17 | 25 | 22 | 21 | 25 | 22 | 58 |
| 26 | 15 | 35 | 26 | 22 | 28 | 26 | 22 | 42 |
| 27 | 15 | 53 | 27 | 22 | 35 | 27 | 22 | 35 |
| 28 | 16 | 12 | 28 | 22 | 42 | 28 | 22 | 28 |
| 29 | 16 | 29 | 29 | 22 | 49 | 29 | 22 | 21 |
| 30 | 16 | 47 | 30 | 22 | 55 | 30 | 22 | 12 |
| 31 | 17 | 4 | | | | 31 | 22 | 4 |

South

South

Solstice.

Declination.

Declination.

1595. The third yeere after the Leape yeere.

Januarie.
D.G.M.

Februarie.
D.G.M.

March.
D.G.M.

| | | |
|----|----|----|
| 1 | 21 | 55 |
| 2 | 21 | 45 |
| 3 | 21 | 36 |
| 4 | 21 | 26 |
| 5 | 21 | 15 |
| 6 | 21 | 4 |
| 7 | 20 | 52 |
| 8 | 20 | 41 |
| 9 | 20 | 29 |
| 10 | 20 | 16 |
| 11 | 20 | 3 |
| 12 | 19 | 50 |
| 13 | 19 | 36 |
| 14 | 19 | 22 |
| 15 | 19 | 8 |
| 16 | 18 | 13 |
| 17 | 18 | 37 |
| 18 | 18 | 23 |
| 19 | 18 | 7 |
| 20 | 17 | 51 |
| 21 | 17 | 35 |
| 22 | 17 | 17 |
| 23 | 17 | 1 |
| 24 | 16 | 43 |
| 25 | 16 | 23 |
| 26 | 16 | 7 |
| 27 | 15 | 50 |
| 28 | 15 | 31 |
| 29 | 15 | 12 |
| 30 | 14 | 54 |
| 31 | 14 | 44 |

South

Declination.

| | | |
|----|----|----|
| 1 | 14 | 14 |
| 2 | 13 | 55 |
| 3 | 13 | 35 |
| 4 | 13 | 15 |
| 5 | 12 | 55 |
| 6 | 12 | 34 |
| 7 | 12 | 14 |
| 8 | 11 | 53 |
| 9 | 11 | 32 |
| 10 | 11 | 10 |
| 11 | 10 | 48 |
| 12 | 10 | 26 |
| 13 | 10 | 5 |
| 14 | 9 | 43 |
| 15 | 9 | 21 |
| 16 | 8 | 50 |
| 17 | 8 | 36 |
| 18 | 8 | 14 |
| 19 | 7 | 51 |
| 20 | 7 | 39 |
| 21 | 7 | 5 |
| 22 | 6 | 42 |
| 23 | 6 | 19 |
| 24 | 5 | 55 |
| 25 | 5 | 32 |
| 26 | 5 | 10 |
| 27 | 4 | 45 |
| 28 | 4 | 23 |

South Declination.

Sunne in
the Equi-
noctiall.

North Declination.

| | | |
|----|---|----|
| 1 | 3 | 59 |
| 2 | 3 | 36 |
| 3 | 3 | 12 |
| 4 | 2 | 48 |
| 5 | 2 | 25 |
| 6 | 2 | 1 |
| 7 | 1 | 37 |
| 8 | 1 | 13 |
| 9 | 0 | 50 |
| 10 | 0 | 26 |
| 11 | 0 | 1 |
| 12 | 0 | 20 |
| 13 | 0 | 44 |
| 14 | 1 | 7 |
| 15 | 1 | 30 |
| 16 | 1 | 54 |
| 17 | 2 | 17 |
| 18 | 2 | 41 |
| 19 | 3 | 4 |
| 20 | 3 | 28 |
| 21 | 3 | 51 |
| 22 | 4 | 14 |
| 23 | 4 | 37 |
| 24 | 5 | 00 |
| 25 | 5 | 24 |
| 26 | 5 | 47 |
| 27 | 6 | 9 |
| 28 | 6 | 32 |
| 29 | 6 | 54 |
| 30 | 7 | 17 |
| 31 | 7 | 40 |

G

1595 The third year after the Leape year.

| Aprill. D. G. M. | | | May. D. G. M. | | | Iune D. G. M. | | |
|---------------------|----|----|------------------|----|----|------------------|----|----|
| 1 | 8 | 3 | 1 | 17 | 41 | 1 | 23 | 3 |
| 2 | 8 | 24 | 2 | 17 | 57 | 2 | 23 | 7 |
| 3 | 8 | 46 | 3 | 18 | 12 | 3 | 23 | 11 |
| 4 | 9 | 8 | 4 | 18 | 27 | 4 | 23 | 14 |
| 5 | 9 | 30 | 5 | 18 | 42 | 5 | 23 | 18 |
| 6 | 9 | 51 | 6 | 18 | 55 | 6 | 23 | 20 |
| 7 | 10 | 13 | 7 | 19 | 10 | 7 | 23 | 22 |
| 8 | 10 | 34 | 8 | 19 | 24 | 8 | 23 | 24 |
| 9 | 10 | 54 | 9 | 19 | 38 | 9 | 23 | 26 |
| 10 | 11 | 15 | 10 | 19 | 49 | 10 | 23 | 27 |
| 11 | 11 | 36 | 11 | 20 | 2 | 11 | 23 | 28 |
| 12 | 11 | 56 | 12 | 20 | 14 | 12 | 23 | 28 |
| 13 | 12 | 16 | 13 | 20 | 27 | 13 | 23 | 28 |
| 14 | 12 | 36 | 14 | 20 | 38 | 14 | 23 | 28 |
| 15 | 12 | 56 | 15 | 20 | 49 | 15 | 23 | 26 |
| 16 | 13 | 16 | 16 | 21 | 0 | 16 | 23 | 25 |
| 17 | 13 | 35 | 17 | 21 | 11 | 17 | 23 | 23 |
| 18 | 13 | 55 | 18 | 21 | 21 | 18 | 23 | 20 |
| 19 | 14 | 14 | 19 | 21 | 31 | 19 | 23 | 18 |
| 20 | 14 | 32 | 20 | 21 | 40 | 20 | 23 | 15 |
| 21 | 14 | 50 | 21 | 21 | 49 | 21 | 23 | 11 |
| 22 | 15 | 9 | 22 | 21 | 58 | 22 | 23 | 8 |
| 23 | 15 | 26 | 23 | 22 | 6 | 23 | 23 | 3 |
| 24 | 15 | 44 | 24 | 22 | 14 | 24 | 22 | 59 |
| 25 | 16 | 1 | 25 | 22 | 21 | 25 | 22 | 54 |
| 26 | 16 | 19 | 26 | 22 | 28 | 26 | 22 | 48 |
| 27 | 16 | 46 | 27 | 22 | 35 | 27 | 22 | 42 |
| 28 | 16 | 53 | 28 | 22 | 41 | 28 | 22 | 35 |
| 29 | 17 | 9 | 29 | 22 | 48 | 29 | 22 | 28 |
| 30 | 17 | 25 | 30 | 22 | 53 | 30 | 22 | 22 |
| | | | 31 | 22 | 58 | | | |

North

North

Solstice.

Declination.

Declination.

1595. The third yeere after the Leape yeere.

| July. D.G.M. | August. D.G.M. | September. D. G. M. |
|-----------------|-------------------|------------------------|
| 1 22 14 | 1 15 30 | 1 4 48 |
| 2 22 6 | 2 15 12 | 2 4 27 |
| 3 21 58 | 3 14 55 | 3 4 2 |
| 4 21 49 | 4 14 37 | 4 3 48 |
| 5 21 40 | 5 14 18 | 5 3 16 |
| 6 21 31 | 6 14 0 | 6 2 52 |
| 7 21 20 | 7 13 40 | 7 2 28 |
| 8 21 11 | 8 13 21 | 8 2 6 |
| 9 21 0 | 9 13 2 | 9 1 49 |
| 10 20 49 | 10 12 43 | 10 1 19 |
| 11 20 38 | 11 12 23 | 11 0 55 |
| 12 20 27 | 12 12 3 | 12 0 32 |
| 13 20 15 | 13 11 43 | 13 0 10 |
| 14 20 2 | 14 11 22 | 14 0 14 |
| 15 19 49 | 15 11 2 | 15 0 38 |
| 16 19 36 | 16 10 41 | 16 1 1 |
| 17 19 23 | 17 10 20 | 17 1 24 |
| 18 19 10 | 18 9 59 | 18 1 48 |
| 19 18 56 | 19 9 38 | 19 2 11 |
| 20 18 41 | 20 9 17 | 20 2 35 |
| 21 18 22 | 21 8 55 | 21 2 58 |
| 22 18 13 | 22 8 34 | 22 3 21 |
| 23 17 58 | 23 8 12 | 23 3 45 |
| 24 17 43 | 24 7 50 | 24 4 8 |
| 25 17 27 | 25 7 28 | 25 4 31 |
| 26 17 12 | 26 7 6 | 26 4 54 |
| 27 16 56 | 27 6 43 | 27 5 17 |
| 28 16 39 | 28 6 21 | 28 5 41 |
| 29 16 23 | 29 5 57 | 29 6 3 |
| 30 16 4 | 30 5 35 | 30 6 25 |
| 31 15 48 | 31 5 13 | |

North

North Declination.

Sun in
the Equi-
noctall.

South Declination.

Declination.

1595. The third yeare after the Leape yeare.

| October D. G.M. | | | November D.G.M. | | | December, D.G.M. | | | | |
|--------------------|----|----|--------------------|----|----|---------------------|-----------|----|----|----|
| 1 | 6 | 47 | South | 1 | 17 | 17 | South | 1 | 22 | 59 |
| 2 | 7 | 10 | | 2 | 17 | 33 | | 2 | 23 | 4 |
| 3 | 7 | 33 | | 3 | 17 | 50 | | 3 | 23 | 8 |
| 4 | 7 | 55 | | 4 | 18 | 5 | | 4 | 23 | 12 |
| 5 | 8 | 17 | | 5 | 18 | 21 | | 5 | 23 | 15 |
| 6 | 8 | 39 | | 6 | 18 | 37 | | 6 | 23 | 19 |
| 7 | 9 | 1 | | 7 | 18 | 51 | | 7 | 23 | 21 |
| 8 | 9 | 23 | | 8 | 19 | 6 | | 8 | 23 | 23 |
| 9 | 9 | 45 | | 9 | 19 | 20 | | 9 | 23 | 25 |
| 10 | 10 | 7 | | 10 | 19 | 34 | | 10 | 23 | 26 |
| 11 | 10 | 27 | | 11 | 19 | 48 | | 11 | 23 | 27 |
| 12 | 10 | 50 | | 12 | 20 | 1 | Solstice. | 12 | 23 | 28 |
| 13 | 11 | 12 | 13 | 20 | 24 | 13 | | 23 | 28 | |
| 14 | 11 | 33 | 14 | 20 | 27 | 14 | | 23 | 28 | |
| 15 | 11 | 54 | 15 | 20 | 39 | 15 | | 23 | 27 | |
| 16 | 12 | 15 | 16 | 20 | 51 | 16 | | 23 | 25 | |
| 17 | 12 | 36 | 17 | 21 | 2 | 17 | | 23 | 23 | |
| 18 | 12 | 56 | 18 | 21 | 13 | 18 | | 23 | 20 | |
| 19 | 13 | 16 | 19 | 21 | 24 | 19 | | 23 | 17 | |
| 20 | 13 | 36 | 20 | 21 | 34 | 20 | | 23 | 15 | |
| 21 | 13 | 56 | 21 | 21 | 44 | 21 | | 23 | 19 | |
| 22 | 14 | 16 | 22 | 21 | 53 | 22 | | 23 | 6 | |
| 23 | 14 | 34 | 23 | 22 | 2 | 23 | | 23 | 1 | |
| 24 | 14 | 54 | 24 | 22 | 11 | 24 | | 22 | 56 | |
| 25 | 15 | 12 | 25 | 22 | 19 | 25 | | 22 | 50 | |
| 26 | 15 | 30 | 26 | 22 | 26 | 26 | | 22 | 44 | |
| 27 | 15 | 49 | 27 | 22 | 33 | 27 | | 22 | 37 | |
| 28 | 16 | 7 | 28 | 22 | 40 | 28 | | 22 | 30 | |
| 29 | 16 | 25 | 29 | 22 | 47 | 29 | | 22 | 23 | |
| 30 | 16 | 42 | 30 | 22 | 53 | 30 | | 22 | 14 | |
| 31 | 16 | 59 | | | | 31 | | 22 | 6 | |

1596. The Leape yeare.

| Ianuarie D. G. M. | | | Februarie D.G.M. | | | March. D. G. M. | | |
|----------------------|----|----|---------------------|----|----|--------------------|---|----|
| 1 | 21 | 57 | 1 | 14 | 19 | 1 | 3 | 43 |
| 2 | 21 | 48 | 2 | 14 | 0 | 2 | 3 | 20 |
| 3 | 21 | 39 | 3 | 13 | 40 | 3 | 2 | 56 |
| 4 | 21 | 28 | 4 | 13 | 20 | 4 | 2 | 33 |
| 5 | 21 | 18 | 5 | 13 | 0 | 5 | 2 | 9 |
| 6 | 21 | 7 | 6 | 12 | 40 | 6 | 1 | 45 |
| 7 | 20 | 51 | 7 | 12 | 19 | 7 | 1 | 22 |
| 8 | 20 | 44 | 8 | 11 | 58 | 8 | 0 | 57 |
| 9 | 20 | 32 | 9 | 11 | 37 | 9 | 0 | 34 |
| 10 | 20 | 20 | 10 | 11 | 16 | 10 | 0 | 12 |
| 11 | 20 | 6 | 11 | 10 | 55 | 11 | 0 | 12 |
| 12 | 19 | 53 | 12 | 10 | 32 | 12 | 0 | 36 |
| 13 | 19 | 40 | 13 | 10 | 11 | 13 | 0 | 58 |
| 14 | 19 | 26 | 14 | 9 | 49 | 14 | 1 | 22 |
| 15 | 19 | 12 | 15 | 9 | 27 | 15 | 1 | 45 |
| 16 | 18 | 56 | 16 | 9 | 5 | 16 | 2 | 9 |
| 17 | 18 | 41 | 17 | 8 | 43 | 17 | 2 | 33 |
| 18 | 18 | 27 | 18 | 8 | 21 | 18 | 2 | 56 |
| 19 | 18 | 10 | 19 | 7 | 58 | 19 | 3 | 19 |
| 20 | 17 | 55 | 20 | 7 | 36 | 20 | 3 | 42 |
| 21 | 17 | 39 | 21 | 7 | 13 | 21 | 4 | 6 |
| 22 | 17 | 21 | 22 | 6 | 50 | 22 | 4 | 29 |
| 23 | 17 | 5 | 23 | 6 | 27 | 23 | 4 | 52 |
| 24 | 16 | 47 | 24 | 6 | 3 | 24 | 5 | 14 |
| 25 | 16 | 31 | 25 | 5 | 40 | 25 | 5 | 38 |
| 26 | 16 | 12 | 26 | 5 | 18 | 26 | 6 | 0 |
| 27 | 15 | 55 | 27 | 4 | 53 | 27 | 6 | 22 |
| 28 | 15 | 36 | 28 | 4 | 31 | 28 | 6 | 45 |
| 29 | 15 | 17 | 29 | 4 | 6 | 29 | 7 | 7 |
| 30 | 14 | 59 | | | | 30 | 7 | 30 |
| 31 | 14 | 39 | | | | 31 | 7 | 52 |

South Declination.

Sunne in
the Equi-
noctiall.

North Declination.

G.iii.

1596.

The Leape yeere.

April.
D. G. M.May.
D. G. M.June.
D. G. M.

| | | |
|----|----|----|
| 1 | 6 | 13 |
| 2 | 8 | 36 |
| 3 | 8 | 57 |
| 4 | 9 | 19 |
| 5 | 9 | 41 |
| 6 | 10 | 1 |
| 7 | 10 | 23 |
| 8 | 10 | 43 |
| 9 | 11 | 4 |
| 10 | 11 | 25 |
| 11 | 11 | 45 |
| 12 | 12 | 6 |
| 13 | 12 | 26 |
| 14 | 12 | 46 |
| 15 | 13 | 5 |
| 16 | 13 | 24 |
| 17 | 13 | 44 |
| 18 | 14 | 3 |
| 19 | 14 | 22 |
| 20 | 14 | 40 |
| 21 | 14 | 58 |
| 22 | 15 | 16 |
| 23 | 15 | 34 |
| 24 | 15 | 51 |
| 25 | 16 | 9 |
| 26 | 16 | 26 |
| 27 | 16 | 43 |
| 28 | 16 | 59 |
| 29 | 17 | 16 |
| 30 | 17 | 31 |

North

Declination.

| | | |
|----|----|----|
| 1 | 17 | 48 |
| 2 | 18 | 3 |
| 3 | 18 | 18 |
| 4 | 18 | 33 |
| 5 | 18 | 47 |
| 6 | 19 | 1 |
| 7 | 19 | 16 |
| 8 | 19 | 29 |
| 9 | 19 | 41 |
| 10 | 19 | 54 |
| 11 | 20 | 7 |
| 12 | 20 | 19 |
| 13 | 20 | 31 |
| 14 | 20 | 43 |
| 15 | 20 | 54 |
| 16 | 21 | 4 |
| 17 | 21 | 15 |
| 18 | 21 | 25 |
| 19 | 21 | 35 |
| 20 | 21 | 44 |
| 21 | 21 | 53 |
| 22 | 22 | 1 |
| 23 | 22 | 10 |
| 24 | 22 | 17 |
| 25 | 22 | 25 |
| 26 | 22 | 32 |
| 27 | 22 | 38 |
| 28 | 22 | 45 |
| 29 | 22 | 51 |
| 30 | 22 | 56 |
| 31 | 23 | 1 |

North

Solstice

Declination.

| | | |
|----|----|----|
| 1 | 23 | 5 |
| 2 | 23 | 10 |
| 3 | 23 | 13 |
| 4 | 23 | 17 |
| 5 | 23 | 19 |
| 6 | 23 | 21 |
| 7 | 23 | 23 |
| 8 | 23 | 25 |
| 9 | 23 | 26 |
| 10 | 23 | 27 |
| 11 | 23 | 28 |
| 12 | 23 | 28 |
| 13 | 23 | 28 |
| 14 | 23 | 26 |
| 15 | 23 | 25 |
| 16 | 23 | 23 |
| 17 | 23 | 21 |
| 18 | 23 | 19 |
| 19 | 23 | 16 |
| 20 | 23 | 12 |
| 21 | 23 | 9 |
| 22 | 23 | 4 |
| 23 | 23 | 0 |
| 24 | 22 | 55 |
| 25 | 22 | 49 |
| 26 | 22 | 44 |
| 27 | 22 | 37 |
| 28 | 22 | 30 |
| 29 | 22 | 23 |
| 30 | 22 | 15 |

1596. The Leape yeare.

July
D. G. M.

August
D. G. M.

September.
D. G. M.

| | | |
|----|----|----|
| 1 | 22 | 7 |
| 2 | 21 | 59 |
| 3 | 21 | 51 |
| 4 | 21 | 41 |
| 5 | 21 | 33 |
| 6 | 21 | 22 |
| 7 | 21 | 13 |
| 8 | 21 | 3 |
| 9 | 20 | 51 |
| 10 | 20 | 41 |
| 11 | 20 | 29 |
| 12 | 20 | 17 |
| 13 | 20 | 5 |
| 14 | 19 | 53 |
| 15 | 19 | 40 |
| 16 | 19 | 27 |
| 17 | 19 | 14 |
| 18 | 18 | 59 |
| 19 | 18 | 45 |
| 20 | 18 | 31 |
| 21 | 18 | 16 |
| 22 | 18 | 2 |
| 23 | 17 | 46 |
| 24 | 17 | 31 |
| 25 | 17 | 14 |
| 26 | 16 | 59 |
| 27 | 16 | 41 |
| 28 | 16 | 23 |
| 29 | 16 | 7 |
| 30 | 15 | 52 |
| 31 | 15 | 33 |

North

Declination.

| | | |
|----|----|----|
| 1 | 15 | 15 |
| 2 | 14 | 58 |
| 3 | 14 | 39 |
| 4 | 14 | 21 |
| 5 | 14 | 2 |
| 6 | 13 | 43 |
| 7 | 13 | 24 |
| 8 | 13 | 5 |
| 9 | 12 | 45 |
| 10 | 12 | 26 |
| 11 | 12 | 6 |
| 12 | 11 | 46 |
| 13 | 11 | 25 |
| 14 | 11 | 5 |
| 15 | 10 | 44 |
| 16 | 10 | 23 |
| 17 | 10 | 2 |
| 18 | 9 | 41 |
| 19 | 9 | 19 |
| 20 | 8 | 58 |
| 21 | 8 | 36 |
| 22 | 8 | 15 |
| 23 | 7 | 53 |
| 24 | 7 | 32 |
| 25 | 7 | 10 |
| 26 | 6 | 48 |
| 27 | 6 | 25 |
| 28 | 6 | 2 |
| 29 | 5 | 39 |
| 30 | 5 | 17 |
| 31 | 4 | 52 |

North Declination.

Sunne in
the Equi-
noctiall.

South Declination.

| | | |
|----|---|----|
| 1 | 4 | 31 |
| 2 | 4 | 6 |
| 3 | 3 | 44 |
| 4 | 3 | 21 |
| 5 | 2 | 56 |
| 6 | 2 | 34 |
| 7 | 2 | 10 |
| 8 | 1 | 47 |
| 9 | 1 | 23 |
| 10 | 0 | 59 |
| 11 | 0 | 36 |
| 12 | 0 | 13 |
| 13 | 0 | 10 |
| 14 | 0 | 34 |
| 15 | 0 | 57 |
| 16 | 1 | 20 |
| 17 | 1 | 44 |
| 18 | 2 | 7 |
| 19 | 2 | 31 |
| 20 | 2 | 54 |
| 21 | 3 | 17 |
| 22 | 3 | 41 |
| 23 | 4 | 4 |
| 24 | 4 | 27 |
| 25 | 4 | 51 |
| 26 | 5 | 14 |
| 27 | 5 | 30 |
| 28 | 6 | 0 |
| 29 | 6 | 23 |
| 30 | 6 | 46 |

1596

The Leape yeare.

| October | | | November | | | December. | | |
|---------|----|----|----------|----|----|-----------|----|----|
| D. G. M | | | D. G. M | | | D. G. M. | | |
| 1 | 7 | 8 | 1 | 17 | 36 | 1 | 23 | 51 |
| 2 | 7 | 31 | 2 | 17 | 53 | 2 | 23 | 10 |
| 3 | 7 | 54 | 3 | 18 | 9 | 3 | 23 | 13 |
| 4 | 8 | 16 | 4 | 18 | 24 | 4 | 23 | 17 |
| 5 | 8 | 39 | 5 | 18 | 40 | 5 | 23 | 20 |
| 6 | 9 | 1 | 6 | 18 | 54 | 6 | 23 | 22 |
| 7 | 9 | 23 | 7 | 19 | 9 | 7 | 23 | 24 |
| 8 | 9 | 45 | 8 | 19 | 24 | 8 | 23 | 26 |
| 9 | 10 | 8 | 9 | 19 | 38 | 9 | 23 | 27 |
| 10 | 10 | 30 | 10 | 19 | 51 | 10 | 23 | 28 |
| 11 | 10 | 51 | 11 | 20 | 4 | 11 | 23 | 28 |
| 12 | 11 | 13 | 12 | 20 | 17 | 12 | 23 | 28 |
| 13 | 11 | 34 | 13 | 20 | 30 | 13 | 23 | 27 |
| 14 | 11 | 55 | 14 | 20 | 42 | 14 | 23 | 26 |
| 15 | 12 | 16 | 15 | 20 | 54 | 15 | 23 | 24 |
| 16 | 12 | 37 | 16 | 21 | 5 | 16 | 23 | 21 |
| 17 | 12 | 57 | 17 | 21 | 16 | 17 | 23 | 19 |
| 18 | 13 | 17 | 18 | 21 | 27 | 18 | 23 | 16 |
| 19 | 13 | 38 | 19 | 21 | 37 | 19 | 23 | 11 |
| 20 | 13 | 58 | 20 | 21 | 46 | 20 | 23 | 8 |
| 21 | 14 | 17 | 21 | 21 | 55 | 21 | 23 | 3 |
| 22 | 14 | 36 | 22 | 22 | 4 | 22 | 22 | 58 |
| 23 | 14 | 56 | 23 | 22 | 13 | 23 | 22 | 53 |
| 24 | 15 | 14 | 24 | 22 | 21 | 24 | 22 | 46 |
| 25 | 15 | 33 | 25 | 22 | 28 | 25 | 22 | 40 |
| 26 | 15 | 51 | 26 | 22 | 35 | 26 | 22 | 33 |
| 27 | 16 | 9 | 27 | 22 | 43 | 27 | 22 | 25 |
| 28 | 16 | 27 | 28 | 22 | 49 | 28 | 22 | 18 |
| 29 | 16 | 45 | 29 | 22 | 55 | 29 | 22 | 9 |
| 30 | 17 | 2 | 30 | 23 | 0 | 30 | 22 | 1 |
| 31 | 17 | 19 | 9 | 23 | 62 | 31 | 21 | 52 |

South

South

Solstice.

Declination.

Declination.

The Regiment for the Sea. 29

The first Chapter sheweth how to take the height of the Sunne with the Crosse stasse, or with the Astrolobe, and also how to finde the true Meridian, with other necessa-
rie matters.

TO take the true height of the Sunne at the sea, the best way is, to doe it with the Crosse stasse, for that the sea is moueable, and causeth the ship to heave and set little or much. And also vpon the Crosse stasse the degrees be larger marked than the Ring or Astrolobe: and in a large instrument, an error is scene sooner & better, than it is in a small instrument.

Now to take the height of the sunne, to know the Al-
titude of the Pole above the Horizon, doe this: first set
the Sunne with a Compasse to know when he cometh
nere vnto the Meridian: as soone as you see that the sunne
is come vnto the south and by East, then begin to take his
height with the Crosse stasse, in this manner: Put the
Transuersarie vpon the long stasse, then set the ende of
the long stasse close at y^e corner of your eye, winking with
your other eye, and remouing the Transuersarie for-
wards or backwards, untill you doe see the lower ende of
it (being iust with the Horizon) and the upper ende of it,
(being iust with the middle of the Sunne) both to agree
with the same and the Horizon at one time: and so haue
you the true height of the sunne. This done, still obserue
the same, untill you see the sunne at the highest, and be-
ginning to descend, then haue you finished.

Yet notwithstanding this is to be noted: that it is best
to take the height of the Sunne with the Crosse stasse,
when the sunne is vnder little degrees in height above the

How to ob-
serue the
Sunne.

To take y^e
height of
the Sunne
with the
crosse staf

The cause
why the
crosse staff
is best to

The Regiment for the Sea.

take the
height of
the Sunne
vnder 50.
degrees.

Horizon, for two causes. The one is this: vntill the sun be fiftie degrees in height, the degrees be largely marked vpon the crosse staffe, but after (the Sunne being aboue 50. degrees high) they be lesser marked then the other are, for that the sunne being vnder 50. degrees in height, you may easely take the height, because you may easely see or view the vpper ende and the nether ende of the Crosse staffe both at one time: but if it doth excede 50 degrees, then by the meanes of casting your eye vpwards & downe wards so much, you may sone commit error, and then in like manner, the degrees be so small marked, that if the sunne doth passe 50 or 60 degrees in height, you must leaue the crosse staffe, and vse the marriners King, called by them the Astrolaby.

To take y
height of
the Sunne
with the
Astrolaby
How to
correct
your Astro
laby if it
doth not
hang vp-
right.

Now to take the height of the Sunne with the com-
mon King or Astrolaby, doe thus: The sunne being (as
before is declared) nere the Meridian or South, obserue
it (vntill you haue the greatest height thereof) in this ma-
ner: Holde the King of the Astrolaby vpon one of your
fingers, and turne the Alhidada vp and downe, vntill you
see the shadow of the Sunne pearce or passe through both
the sights thereof, being sure that the Astrolaby doth hang
vp-right, which you may proue in this maner.

Looke at how many degrees and minutes the Alhidada
doth stand vpon the Astrolaby, then tourne the Alhidada
vnto the same number of the degrees and minutes on the
other side of the Astrolaby, and then taking the height of
the sunne againe, if it doe agree as it dyd before, then the
Astrolaby doth hang vp-right: but if it doe not, then it
doth not hang vp-right. For knowledge of the true height
of the sunne (the Astrolaby not hanging vp-right). do thus:
If the Astrolaby be truely marked, marke the diuersitie,
that being knowne, rebate from the greatest height halfe
the diuersitie, or else adde vnto the lesser height halfe the
diuersitie, & that shall be the true height of the sunne, al-
though

though that the Astrolabie doth not hang vpright.

The Astrolabie is best to take the height of the sunne, if the sunne be very high, at 60. 70. or 80 degrees: and the cause is this: The sunne comming nere vnto your Zenith, hath great power of light, so to pearce the two sights of the Alhidada of the Astrolabie, and then it is not good to vse the crosse staffe, for that the sunne hurteth the eyes of a man, and besides that, it is too bright to occupy the crosse staffe, (as befoze is declared) so that this way you may very much preserue your eyes. If you haue not glasses vpon your staffe (to save your eyes in taking y height of the sunne) but be vnprouided of them, doe thus: take and couer the sunne, with the ende of the Transuersarie of the crosse staffe, vnto the very vpper edge or brink of the sunne, (so shall you not neede to behold the brightnesse of it) and with the other ende of the Transuersarie to take the Horizon truely, & that being done, because the sunne is 30. or 31. minutes in Diameter or breadth, therefore you shall rebate 15 minutes from the Altitude or height of the sunne, and then that which shall remaine, shall be the true height of the sunne, from the Centre or middle of y sunne. And furthermore, there is some errour in the taking the sunne or starre with the Ballastell or Crosse staffe, and that groweth by this meanes: so that the true centre (which is the sight of the eye) is within in the middle of the eye, and not in the outside of the eye: so that the ende of the long staffe in the setting of it vnto the corner of your eye, doth stand somewhat further out than y sight of your eye, that is to say, that y sight of the eye is somewhat further into the head, than the ende of the staffe doth come vnto: wherefoze you must pare away a little of the end of y staffe, for some men vles more, & some men vles lesse, so that it is according as you may sette the staffe vnto your eye, for some men neede pare away little or nothing, and some men must pare away 14. or 15.

V.ii.

minutes

The Astro-
laby is best
to take the
height of
the Sune
at 60. 70.
or 80. de-
grees in
height.

How to
preserue
your eyes
when you
touch the
sunne with
the Crosse
staffe and
haue no
glasses.

The Dia-
meeter of
the Sun is
30. or 31.
minuts.

Some er-
ror in the
crosse staff
& how to
reform it.

The Regiment for the Sea.

minuts, as you may set the Staffe, because some mens eyes be further into their head, than other some mens are, and the bones of some mens face stand further out than other some doe.

To get the true Meridian vpon the land.
It is mozeouer conuenient to know the true Meridian or South, which you must doe either with a good Compassse, or with a perfect Diall or Needle: but if you be on the land, this you may doe, on a peece of timber or any other thing that standeth fast, with a paire of compasses make a circle, then in the middle or center where the foot of the compassse did stand, set a wiew vpight (as circumspectly as you can) and then you may doe this: looke in the morning (so it be on playne ground, that you may see the Horizon circle, without any let at the sunne rising, for the shadow of the wiew) and there set a prick: then at the setting of the sunne you shall set another prick, euen at the circumference of the circle, then deuide that with your compasses euen in two peeces, and strike a straight line from the wiew or center of the circle, to the middle or deuided prick, and that shall be the true Meridian. Or else (the wiew standing vpight) first in the forenone when the toppe of the wiew doth touch, or is readie to co. into the circumference or edge of the circle, there make a pricke: then in the afternone in lyke manner, where the shadow of the wiew toucheth the edge of the circle, there make an other prick euen with the ende out of the shadow: this done (as circumspectly as you can) deuide these two pricks in the middle, then as is befoze said, draw a line from the center or wiew, to the middle prick, and that shadow shall be your true Meridian.

After an other maner you may doe this: looke & watch when the wiew giueth the shortest shadow, & there make a prick, then draw a line from that prick to the wiew, which shall be the true Meridian.

To know

And yet furthermoze, for that it is most conuenient to

The Regiment for the Sea. 31

to know the true Meridian at the sea, because in long voyages, going farre vnto the Westward or Eastward, the compasse doth varie: to finde the true Meridian, doe this. Set the sunne with your compasse at his rising or appearing aboue the Horizon, and then (knowing what point and part the sunne doth rise at) set the sunne with your Compasse at his setting or departing vnder the Horizon, and (that being knowen) you shall perfectly know whether the compasse be varied, and how much by diuiding the peece of the circle contained betwene the rising & setting of the sunne into two equall parts, for the right line drawne from the center of the flie thozough the point of the partition expzesseth the true Meridian, and the portion of the circle contained betwene the saide line & the south point of your compasse sheweth the quantitie of the variation. For ensample this, I doe set the sunne at his rising with the compasse, and he doth rise vpon the East point: in lyke maner also I doe set the sunne with the compasse at his setting, & doe finde him to set West North-west: so I doe see the compasse to be varied one point, that is to say, the North point doth stand North and by East, &c. And furthermore, (for that seldome times the sunne doth rise and set cleere by the meanes of the cloudes, and other impediments next the Horizon) you may get the true Meridian thus: at any tyme in the forenoone, first set the sunne with your compasse, and then take the true height of the sunne.

Now you (knowing how many degrees the sunne was high at that point of the compasse) you may in lyke maner obserue the sunne in the afternoone, vntill you doe finde the sunne iust at that height that it was in the forenoone, marking at what point of the compasse the sunne is, and so shall you see perfectly whether the compasse be varied or no, & also how much: for ensample thus, I take the sunne vpon the southeast point 20. degrees aboue the Horizon,

D.iii.

and

the true Meridian at the sea, and also if your compasse be varied and to know how much they be varied.

The Regiment for the Sea.

then in the afternoone I doe observe the sunne until such time as I doe finde the sunne tust 20. Degrés above the Horizon againe, and then I set the sunne with the compasse, and do finde the sunne to be at 20 Degrés in height West southwest, so that I see the compasse to be varied one point, that is to say, the North point doth stand North and by East, &c.

To find
the varia-
tion of the
compasse
in y night,
by y stars
but not by
y moone.

Another way also to know the true Meridian by the sunne is this: to set the sunne with the compasse at hir greatest height above the Horizon, and so you shall know whether the compasse be varied, and how much: and looke what is spoken of the sunne by day, you may doe the like by night by any of the starres that you perfectly do know, doing as you doe by the sunne in all points: but you cannot doe it so well and truly by the Moone, by the meanes of the witness of hir motion in the Zodiack, you may also finde the variation of the compasse by the North star, as thus: sette the North starre with the compasse, if the North point doe stand right with the starre, then it is not varied, but if it doth not stand right with the starre, then it is varied: and that must be done when the two starres of Charles wayne called the pointers, be right vnder or right over the North starre, but if that the starres be West from the North starre, then the North starre is the third part of a point vnto the Eastwarde of the North Pole. If the two starres of Charles wayne, called the pointers, be due East from the North starre, then y North starre, is the third part of a point vnto the westward of the North Pole, &c.

Meddle
not with

This haue I sayde, because that sometime in sundrie places, the compasse doth varie (the variation is called the Northeasting or Northwesting of the compasse) and especially in the sayling of long voyages, running East and West, therefore I would not wish them to meddle with the wending of their compasse, or whetting of the side of the needle,

The Regiment for the Sea. 32

needle, to the ende, to make it stand due North, but circum-
spectly to awaite the altering of the compasse, and what
quantitie it doth alter: as you may doe very well by the
order before rehearsed, and then let your compasse alone:
for although that it doth varie two or three pointes, you
may make account according to the variation, as thus, I
admit the Northwest point standeth due North, and my
course is to goe due West, I will occupie the Southwest
point in this case for the west point. And thus (by observa-
tion and trying of my compasse) I care not what point
standeth due North, for it is all one, so that you consider
what point standeth North. And also there is deuised by
one Norman, a compasse maker, a very necessarie device
in a compasse, that you may set the North point, vpon
what degree you list, according vnto the true variation of
the compasse, at all times at your pleasure.

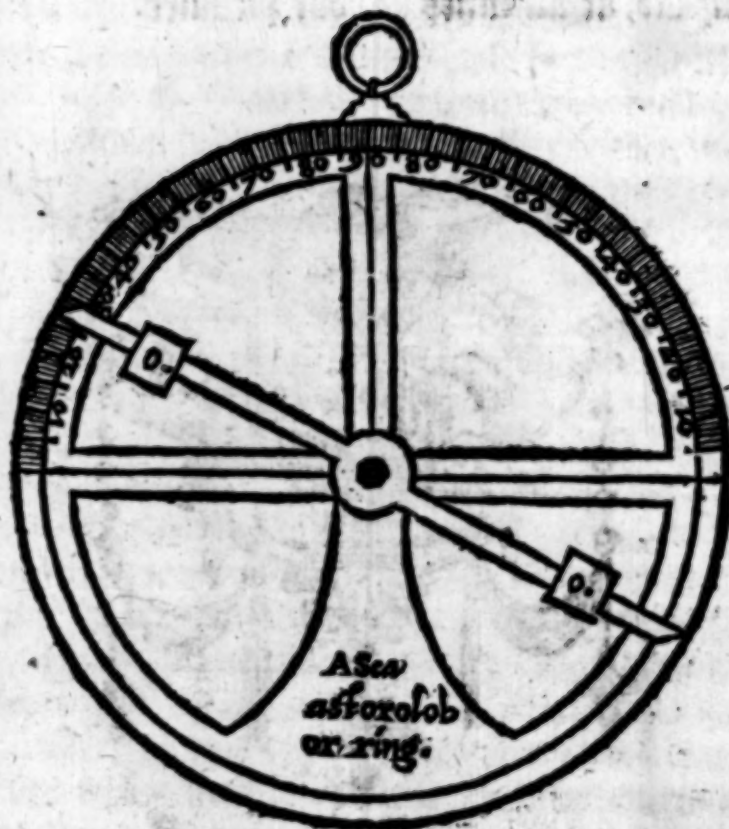
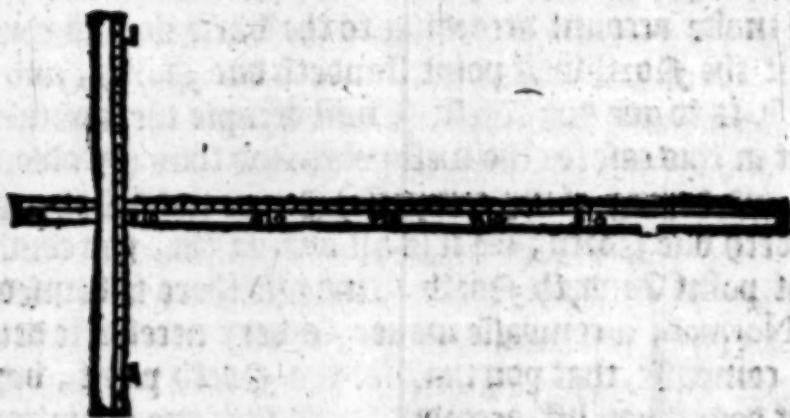
your com-
passe, al-
though it
be varied.
To saile by
the com-
passe that
is varied.



The Regiment for the Sea.

The Bella Stella, or Crosse staffe:

to take the height of the Sunne or Starre.



The vii. Chapter sheweth how to handle the declination of the Sunne to know the altitude of the North Pole about the Horizon, (the height of the Sunne beeing truly taken and knowen in any place betweene the North Pole and the Equinoctiall) so that the Sunne be vnto the Southwardes of you, at the taking of the Sunne vpon the Meridian.

YOU must consider by the Regiment or table of declination (going before) that the 11 day of March the Sunne is in the Equinoctiall, entering then the first point of Aries, (called the Equinoctiall, of the spring time, where he hath no declination). The 10 day of Aprill, the sunne entereth into the first minute of Taurus, then hauing declination to the Northwardes 11 degrees 30 minutes. The 12 day of May, the Sunne entreth the first point of Gemini, hauing then declination 20 degrees 12 minutes. The 12 day of June the sunne entereth into Cancer, where he (making his greatest progresse to the Northwardes) hath 23 degrees 28 minutes of declination. But now in this our time, some doe affirme it to be 23 degrees and a halfe, but it lacketh two minutes. The 14. day of July the sunne entereth into Leo, coming downewardes to the Equinoctiall, hauing twenty degrees 12 minutes of declination. The 14 day of August the sunne entereth into Virgo, hauing declination 11. degrees 30 minutes. The 14 of September, the sunne entreth into Libra, (then being in the Equinoctiall, & ha-

The greatest declination of the Sunne

The Regiment for the Sea.

Equinocti
all of au-
tunne.

The gre-
test decli-
nation to
the South

The yeere
is compa-
red vnto
a Ring or
Adder bi-
ting her
taile.

The
height of
the Sunne
being takē

uing no declination) which is called the Equinoctiall of Autumne or harvest where he beginneth his south declination. The 14 of October the sunne entereth into Scorpio, where his declination is 11 degrees 30 minutes. The 12 of November the sunne entereth into Sagittarius, his declination being 20 degrees 12 minutes. The 12 day of December the sunne entereth the first minute of Capricorne, where the sunne (making the greatest progresse to the southwards) hath of declination 23 Degrees and 28 minutes. From whence he returneth to the Equinoctiall againe. The 11 of Januarie the sunne entereth into Aquarius, where his declination is 20 Degrees 12 minutes. The 10 day of Februarie the sunne entereth into the first minute of Pisces, & hath of declination 11 Degrees thirtie minutes. The 11 day of March, the sunne returneth to the selfe same place that it departed from before: wherefore the Egyptians dyd paynt the yeere like to an Adder byting her tayle, and (not hauing the vse of letters) they made a Ring, and named it Annulus, as it were Annus, that is to say, a yeere, because a Ring doeth tourne rounde in it selfe, as doth the yeere. The height of the sunne being knowen, you knowing the day of the moneth, and what yeere it is after the Bissextilis,) must turne to the day of the month, in the regiment or Table going before, where right against the day of the moneth you shall finde the degrees of declination, and the odder minutes belonging to the Degrees of declination following: that being knowen (that is to say, the height of the sunne with the degrees and minutes of the declination) if the sunne haue North declination, you shall subtract or take away the sunnes declination from the height of the sunne: and then that which remaineth shall be the true height of the Equinoctiall, which being knowen, and being subducted out of 90. that which doth remaine, shall be the true height of the North Pole aboue the

The Regiment for the Sea. 34

the horizon. But if that the sun hath south declination, you shall adde or put that declination vnto the height of the sun, & totall summe shall shew vnto you the true height of the Equinoctiall, the which summe being taken from 90. that which doth remaine, shall be the altitude to y^e North Pole above the Horizon. For this is to be noted: that what height the Equinoctiall is above the Horizon, such is the distance betwene the Zenith or verticall point, and the North Pole. In like maner, looke how many degrees and minutes are betwene the Equinoctiall and your Zenith, so many degrees and minutes are from the North Pole downe to the Horizon, and this is the cause why you must take the height of the Equinoctiall, out of 90 Degrees. For your Zenith being alwaies 90 degrees from the Horizon, as you see by this figure following the height of the Equinoctiall, being taken out of that number leaue the distance betwene the Zenith, and the Equinoctiall which is equall to the height of the Pole above the Horizon.

& knowen then how to handle the declination to know the height of the Poles.

Things to be noted as touching the taking of y^e altitude of the Pole.



The Regiment for the Sea.

The viii. Chapter sheweth you how to handle the declination of the Sunne : when you are betweene the Equinoctiall and the Sunne : that is to say , the Sunne being to the Southwards or Northwards of you, betweene the Sun and the Equinoctiall , or vnder the Equinoctiall : the height of the Sunne beeing truly knownen or taken.



And furthermore if you bee vnto y south partes nere vnto the Equinoctiall, so that the Sunne haue any great declination either to the Southwardes, or to the Northwardes , you being betweene the Equinoctiall and the Sunne , when you haue taken the true height of the Sunne , with the Astrolabe to know the height of any of the two Poles, doe this: seeke the declination of the sunne for that day , with the degrees and minutes , the declination being knownen and the height of the Sunne in like manner, then adde the declination of the sunne vnto the height thereof, and it will excede or be more than 90 degrees , then againe looke how many degrees it is more than 90 . that shall be the true height of the Pole towards that side that the sunne is : because the Equinoctiall is the number of degrees above 90. (which is your Zenith) to the contrarie parte from the sunnewarde . For (as I haue said in the chapter going before, and it is generall for ever) what height soeuer the Equinoctiall is from the Horizon , that is the true distance betweene the Zenith, and the Pole : in like manner, looke what distance is betweene the Equinoctiall & the Zenith, the same is the true distance betweene the Horizon and the Pole, that is to say , the Pole is so many degrees in altitude above the Horizon . And whereas it is a common saying (in searching how farre we bee vnto

unto the southwardes or Northwardes) that the Pole Arcticke is so many degrees in altitude, or (as some will say,) y^e we are so many degrees in Latitude: y^e saying is all one in respect, although the one be called Altitude or height, and the other Latitude or widenesse: for as when you say Altitude or height of the Pole, you meane y^e pole is rayled so many degrees above the Horizon. So likewise when you say Latitude, you meane, you be so many degrees in widnesse from the Equinoctiall, for that your Zenith or verticall point is so many degrees from the Equinoctiall, as the Altitude is found to be. Moreover, if you chauce to be right vnder the Equinoctiall, as you cannot say that you haue any Latitude, so lykelike cannot you say that you haue any Altitude, for that the two Poles bee then iust with your Horizon, and in like manner the Equinoctiall passeth by your Zenith or verticall point. But when you will take the height of the sunne with your Astrolabie, then looke what declination the sunne hath, either to the southwardes or Northwards. Then put the declination of the sunne vnto the height of the same, and the number will be iust 90 degrees: if it lacketh any thing of 90 degrees, then it signifieth that the Equinoctiall lacketh so much of the Zenith, and so much iust shall the Pole be above the Horizon, towarde that part that you be in from the Sunnewardes. But contrariwise if it doth excede or be any thinge more than 90. degrees, then (as afoze is declared) it signifieth that the Equinoctiall is as much as that number (both in degrees and minutes,) On the contrarie side from the sunwardes, that is to say, your Zenith shall be betwene the Sunne and the Equinoctiall, and the Pole shall be so many degrees or minutes above the Horizon, as is the distance betwene the Zenith and the Equinoctiall, towarde that part or side that the sunne is on. Wherefore I doe thinke it necessarie to giue certaine ensamples (and

Altitude or latitude is all one question in effect.

Being vnder the Equinoctiall you haue neither latitude nor Altitude, for that y^e Equinoctiall is your Zenith, & the Poles your Horizon.

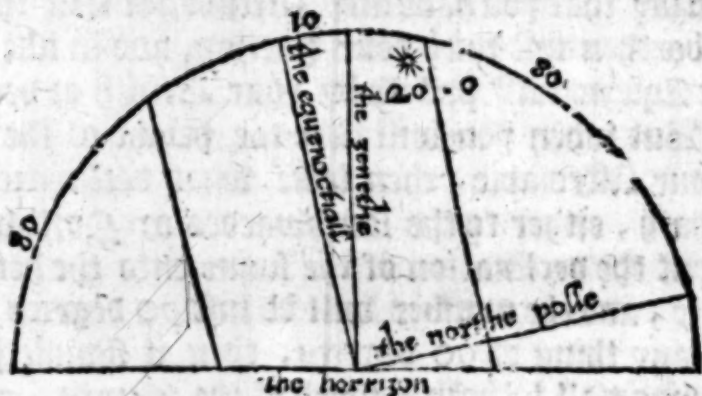
Of your Zenith being betwene the Equinoctiall & the Sunne

The Regiment for the Sea.

An ensam-
ple.

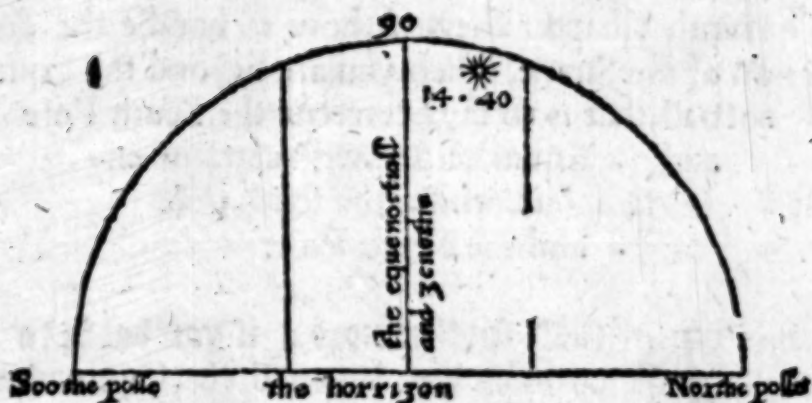
An ensam-
ple where
the Pole
is 10 de-
grees a-
boue the
Horizon.

first take this for an ensample.) Admit I do take y height of the sunne vnto the Northwardes 80 degrees above the Horizon, and the sunne hath declination vnto the Northwardes 20 degrees, to which I adde or put the height, that is to say 80 degrees, being the height of the sunne, and 20 Degrees, being the declination of the sunne, doe make 100. from which I pull 90 away, which is my Zenith, & so there remaineth 10 degrees. Wherefore you may conclude, that the Equinoctiall is 10 degrees to y south part of your Zenith, and the sunne to be 10 degrees to the North part of your Zenith, so that the North Poles is 10 degrees above the Horizon, as by ensample it is declared.



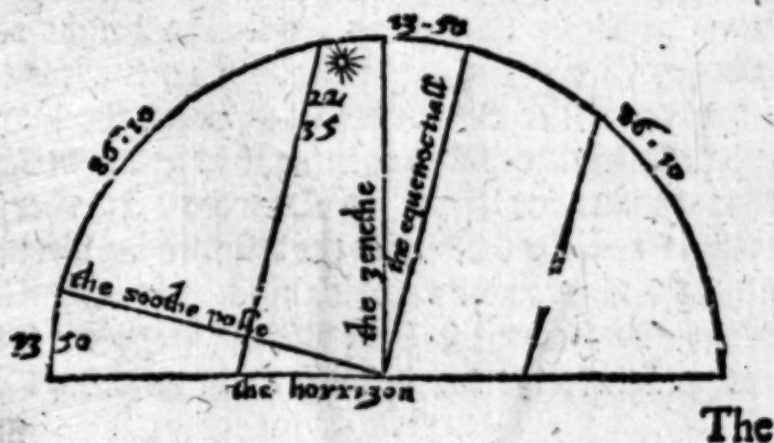
And for the second ensample, admit I take the sunne vnto the Northwardes 75 degrees, and 20 minutes above the Horizon, the sunne having North declination, 14 degrees, forty minutes, I then doe adde or put 14 degrees, forty minutes, vnto 75 Degrees 20 minutes, and those two ioyned together maketh 90 Degrees, whereof you may conclude, that the Equinoctiall is your Zenith, and then the two Poles be with your Horizon, as by this example it doth appeare.

And



And now foloweth to the third ensample. I admit the Sunne be taken with the Astrolabie 81 degrees and 15. minutes above the Horizon, and the sunne hath South Declination 22 degrees 35 minutes, wherefore I doe adde 02 put together 81 degrees and 15 minutes, being the heihgt of the sunne, and 22 degree 35 minutes, being the declination, and that maketh 103 degrees, 50 minutes : from which I take away 90 Degrees, which is my Zenith, so that there remayneth 13 degrees 50 minutes : so that you may safely conclude, that the Equinoctiall is 13 degrees, 50 minutes, unto the North parts of the Zenith, & then it must needs follow, that the South Pole is 13 degrees 50 minutes above the Horizon, as by this ensample it is declared.

An ensample.



The Regiment for the Sea.

The ninth Chapter sheweth how to handle the declination of the Sunne, when you are beyond the Equinoctiall, that is to say, betweene the South Pole and the Equinoctiall : with certaine ensamples both for the south Pole and the North Pole.



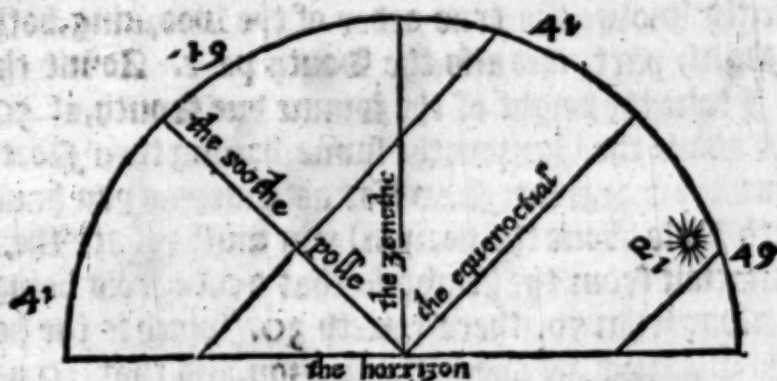
To take the Sunne to the Northward you being betweene the South pole & the Equinoctiall.

An ensample by taking the south pole 41 degrees above the Horizon.

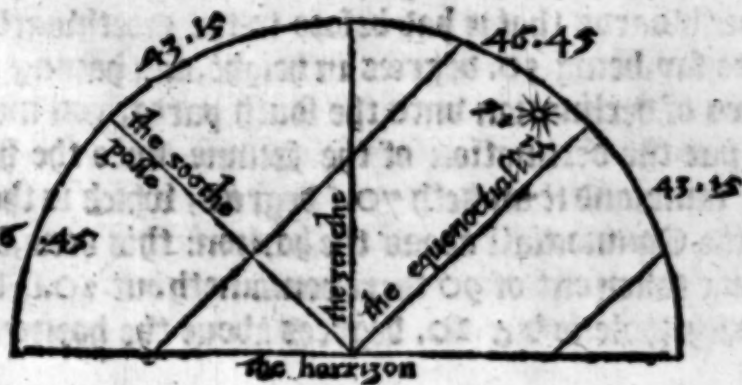
AD furthermore, if you be vnto the southwardes beyonde the Equinoctiall, as betweene the Tropicke of Capricorne and the South Pole, then to vse the declination of the Sunne to knowe the height of the South Pole or Antarticke Pole, by the height of the sunne, there is no other matter in the doing thereof, but whereas we (being vnto the North partes, doe adde the south declination vnto the height of the sunne, and rebate the North declination from the height of the sunne, so in like manner the contrarie is to be used, that is to say, to rebate the south declination from the height of the Sunne and to adde vnto the height of the sunne the North declination. As for ensample, I admit the height of the sunne be taken twenty 8 degrees above the Horizon due North, and the declination of the sunne is twentie 1 degrees vnto the northwardes, I doe then adde the declination of the sunne which is 21 degrees, vnto the height of the sunne (being 28 degrees,) which maketh 49 degrees, and so many degrees the Equinoctiall is above the Horizon vnto the northwardes, and then (as it is befoze declared) pull that summe out from 90 Degrees, and there remaineth 41 degrees, which is the distance betweene the Zenith & the Equinoctiall, which alwaies is equall with the distance betweene the Pole and the Horizon: so that you may conclude the south Pole to be rayged 41 Degrees.

The Regiment for the Sea. 37

grées above the Horizon. As by this figure it is shewed.



And furthermore if the sunne haue south declination, then (as befoze is declared) you must substract or take away the Sunnes declination from the height of the sunne, as for ensample. The height of the sunne being taken at 50. degrees, 30. minutes into the North parts, & the sunne hauing 7 degrees and 15 minutes of declination vnto the Southwards, from which height of the sunne (for that you are vnto the Southwards beyond the Equinoctiall (you must rebate the declinatiō, which is 7. degrees and 15 minutes, and there resteth 43 degrees 15 minutes, for the true height of y Equinoctiall, which summe you must take out of 90 degrees, that done, there remaineth 46 degrees 45 minutes, the true height of the south Pole above the Horizon, otherwise called the Antarticke Pole, as by ensample of this figure is plainly shewed.



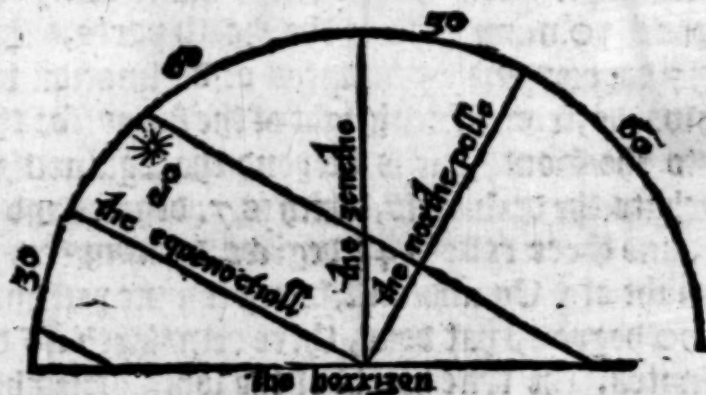
B.

Pet

The Regiment for the Sea.

An ensam-
ple by ta-
king the
north pole
60 degrees
about the
Horizon.

Yet furthermore I doe thinke it conuenient to giue you an ensample vnto the Northwardes, that you may perfectly knowe the true order of the woorking, both for the North part, and also the South part. Admit therefore I take the height of the Sunne due South, at 50. degrees above the Horizon, the sunne hauing then North declination 20. degrees: Now (for as much as you haue the North Pole above the horizon) you must rebate the suns declination from the height: so that 20. degrees being taken away from 50. there resteth 30. which is the height of the Equinotiall above the horizon, and that 30 being taken from 90. there resteth 60. So that you may boldlie affirme the North Pole to be 60. degrees above the horizon, as by this figure following it is shewed.



In like manner the sunne being taken at that height and due South, hauing the like declination also to the Southwardes that it had before to the Northwardes: that is to say, being 50. degrees in height, and hauing 20. degrees of declination vnto the south parts, you must adde or put the declination of the Sunne vnto the height of the same, and it maketh 70. degrees, which is the height of the Equinotiall above the horizon: this done, that 70. being taken out of 90 there remaineth but 20. so that the North Pole is but 20. degrees above the horizon, as by the

The Regiment for the Sea.

The cause
why Eng-
lish men
haue not
trauailed
far beiond
the Equi-
noctia".

An vn-
tepe-
rate place
for extrem
heate.
Téperate
Clymate.

O: being
vnder ey-
ther of the
Poles.

Of taking
the height
of the Sunne

quinotiall, you shal see them rise from the right toward the left hand. Thus much haue I sayde as touching the sunnes declination, because I know that diuers English men would haue trauailed further beyond the Equinotial than they haue done, but that they haue not had the capacitie to handle the sunnes declination when they haue bene beyond the Equinotial, that is to say, vnto the south parts, hauing lost the markes aboue the North Pole, as the North Starre and other, and as for the starres of the south, they haue not bene acquainted with them, but haue beaten vp and downe alongst the coast of Vinny and Winney, and there haue spoyled and consumed their men, thorough the extraordinarie heate of the sunne, not knowing that in going further to the south parts, they should haue brought themselves into a good temperate Climate again.

The tenth Chapter sheweth, how to handle the sunnes declination vnto the Northwards, where the Sunne doth not set vnder the Horizon, & also to take the Sunne at the lowest being due North.

For further vse of the Sunnes declination, if you haue any occasion to trauell vnto the Northwards or southwards moze than 67 degrees of Altitude of any of the two Poles, or if the sunne haue any great declination vnto those parts that you are in, then shall not the sunne goe downe vnder the Horizon in a long time after, according as you are in distance moze or lesse vnto the North parts, for if you were right vnder either of the 2 Poles of the world, then would not the sunne goe vnder the Horizon in halfe a yere, so that ther should be continually day so long. And now for the handling of the Sunnes declination, to know the height of the Pole, and to take the sunne North at the lowest, doe this: First with your crosse staffe, obserue the sun at the lowest, taking the true distance between the

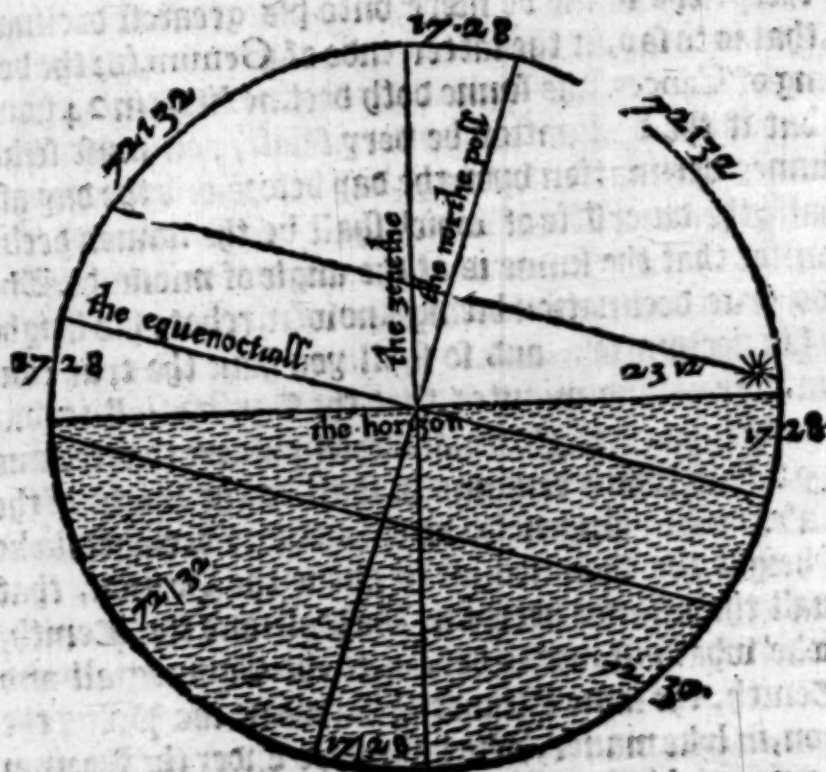
the Horizon and the sunne, that being truely done, looke what declination the sunne hath, then haue you to consider that except the sunne be nere vnto his greatest declination, that is to say, in the latter ende of Gemini, (or the beginning of Cancer,) the sunne doth decline little in 24 houres: but if the declination be very swift, you must seeke the sunnes declination vpon the day before, and the day after, halfe the diuersitie of which shall be the sunnes declination: for that the sunne is at the angle of midnight. The sunnes true declination being knowen, rebate his height from his declination, and so shall you haue the true content in degrees and minutes, that the Equinotiall is vnder the Horizon due North, and then pulling that summe from 90. that which remaineth, shall be the height of the Pole aboue the Horizon: for as it is before declared, looke what height the Equinotiall is aboue the Horizon, that is equall the distance betwene the Pole and the Zenith, and looke what distance is betwene the Equinotiall and the Zenith, the same distance is betwene the Pole & the Horizon, in lyke maner, looke how deepe vnder the Horizon the Equinotiall is vnto y Northwards, so high is y Equinotiall vnto the Southwards. As for ensample, admit I were vnto the Northwards of the North cape, the sunne being in his greatest declination vnto the Northwards, which is about the 11. day of June 23 degrees and nere a halfe: this being knowen, I take the sunne due North at the lowest, iust sixe degrees aboue the Horizon, the declination being 23. degrees and 28. minutes. Wherefore I rebate from that sixe degrees, and so there remaineth 17. degrees & 28. minutes, which expresse the depth of the Equinotiall vnder the Horizon, and then doe I pull that summe from 90. and there remaineth 72. degrees. 32. minutes, so that the true height of the North Pole aboue the Horizon, as by this ensample folowing is declared.

A thing worthy to be noted, touching the sunnes declination

A thing to be noted of the people & the Equinotiall all the Zenith, & the Horizon.

The sunn taken due North at 6 degrees.

The Regiment for the Sea.



By this ensample you may also know the true height of any of the two Poles, and how to observe the sunne at the lowest, when the sunne cometh nearest unto the Horizon, as well as you maye when the sunne is in the Meridian at the greatest height from the Horizon, which is verie necessarie for them that doe occupie unto the northwards, as unto Saint Nicholas in Russia, it is also very necessarie for them that would attempt any voyages of discoverie to finde out the passage to come unto Catais and China, and the Ilands of Moluccas, unto the northwards, as into the East, by Nova Zemla, or to the West by that way that Captaine Frobisher, hath begun to the north.

Of voyages for discovery to the northwards either to the Eastward.

northwards of Baccalaïos and Labradoꝝ, soꝛ it is to be supposed, that amongst that broken lands and Ilandes, that there may be found passage vpon the north part of America, but the great quantity of Ice may somewhat hinder the prosperitie of that discouerie, & yet notwithstanding my opinion is, that it is not frozen there so much to haue such huge quantity of Ice, but that it may bee frozen moze farther vnto the north partes, and so by some current oꝛ streame brought thether, and so is staied vpon the coast of Labradoꝝ and Baccalaïos, by the meanes of the great current that commeth out of the Bay of Mexico, al alongest the north side from Florida vnto Baccalaïos oꝛ new-found land.

And yet notwithstanding, it may be possible that if that they did discouer moze vnto the northwardes, that they should not meete with so much Ice. For at the north cape in Norway, which is much moze vnto the northwardes, there is seldome seen any great quantity of Ice, & yet some ships hath bin beaten of vnto the north of the Cape neere 200 leagues, so that they had then neere 80. Degrees of height of the north Pole aboue the Horizon, and yet they haue not met with Ice, & yet it is farther vnto the north parts by 17. degrees, then that place y^e Frobisher was at.

Wherefoꝛe if it were attempted, there is no doubt but they should finde it nauigable eyther to the East part, oꝛ to the West parte: And I am of this opinion, that the thing most feared in making their discouerie, vnto the northwarde, deserueth not so greatlie to bee feared as they doe make it, the cause why they are so loth to go verie farre vnto the northwardes, is, soꝛ that it is the frozen Zone, but my opinion is, that in Summer time it is not to be feared, but the further vnto the northwardes, the moze temperate warme, by meanes of the long continuance of the Sunne: soꝛ as we see by comon experience, that a thing once being made warme, cannot

by Noua Zemla, or to the west ward by Cape de Paramantia.

Additions,

The Regiment for the Sea.

Of temperatenesse the Pole being raised 80 degrees.

cannot sodainely be made colde, neither is there doubt of any great colde untill the sunne be vnto the Southwards of the Equinodiall: for I admit that a shippe should saile vnto the Northward, and not stay untill the North Pole were eleuated 80 degrees aboue the Horizon, I doe think then they should finde it verie temperate and warme, vnto the middle of September, for that by the space of nine weekes together, that is to say, from the tenth day of May, vnto the twelfth daye of July, the sunne should come no nêrer vnto the Horizon due North then ten degrees, and 30. degrees vnto the South parte aboue the Horizon, and yet it is possible that it may be colde there untill the ende of May, for that the Sunne must haue a time to make the aire warme. For lyke as a thing once being colde, cannot be sodainely made warme, so in like maner a place being once made warme, cannot be sodainly made cold.

The length of the paralell. 80. degrees, is but 1250 English leagues.

And furthermore, hee that were in the Latitude of 80 degrees, should haue but a short Paralell: for the whole compasse of the Earth and sea going East and West, to come round about to that place againe in the same Paralell, is but 1250 English leagues, euery league containing thre English miles: So that in sailing of lesse then 500 or 600 leagues, they might see whether it were nauigable or not. For this is one principle, that if that they doe not meete with lande, then they shall finde sea, to accomplish y long desired passage to finde out Cattate.



The

The xi. Chapter doth shew how you shall know the length of the day, and to know how much the day is shortned or lengthned by the Suns declination.



Now I thinke it convenient for Seafaring men to know the length of the day in any place that they haue occasion to goe vnto: for that they haue occasion to trauell into all the climates and places, transporting themselves many times quickly from one place vnto another: and although the auncient writers haue appointed certaine climates, and other late writers in like manner haue made tables very exact for the longest or shortest day in any of those climates & other places, according to the elevation of the Pole: yet haue they not opened any way vnto them, in giuing any order, for them to know when the day is an houre longer or shorter, whereby they might at all times know the length of the day, which notwithstanding is verie necessarie for them, for that they be abroade vnder saile both night and day, and in like maner for that they must keepe account of houres and times exactly, in as much as they ought to keepe an account of the ships way: wherfore it must needs be most necessarie for Navigation, to know the true time of the suns rising and setting, which you shall know by this meanes: First it is not vnknown, that vnder the Equinoctiall the Sunne is 12 houres aboue the Horizon, and twelue houres vnder the Horizon, (what declination so euer the sunne hath) so that there the sunne riseth at sixe of the clocke and setteth at sixe of the clocke for euer.

And where the Pole is raised 16 degrees and 44. minutes, there the longest daye is 13 houres, (the Sun ha

How necessary it is for a Seafaring man to know the length of the day. Vnder the Equinocti all, the day is alwaies 12 houres long. The Pole

uing,

The Regiment for the Sea.

16 deg. 44
mi. the day
13 houres
long whe
it is at the
longest.
The Pole
30 deg. 48.
mi. y long-
est day 14
houres
longe.

The Pole
41 deg. 23
mi. y long-
est day 15
houres
long.

The Pole
raised 49
deg. 1 mi.
the y long-
est day is
16 houres
long.

The Pole
raised 54
deg. 30

uing her greatest declination at 23 degrees, 28 minutes and the shortest day is 11. houres long, and then looke) when the sunne hath declined 23. Degrees and a halfe either backwards or forwarde, for then the day is an houre longer or shorter and proportionably: when the sunne hath declined 11 degrees forty 4 minutes, then it is halfe an houre longer or shorter, &c. Moreover wher. the Pole is eleuated 30 degrees 48 minutes, there the longest day is 24 houres, and the shortest day is 10 houres long, the sunne then rising at 5 of the clocke, and setting at 7 of the clocke, and there when the sunne hath declined 11 degrees and 44 minutes from the Equinoctiall, &c. vnto the greatest declination, then the day is an houre longer or shorter, and when the sunne hath declined five degrees 52 minutes, then the day is halfe an houre longer or shorter, &c. Furthermore also, where the Pole is raised fortie one degrees 23 minutes, there the longest day is 15 houres, and the shortest 9 houres long, (the sunne hauing his greatest declination, and as then rising at 4. of the clocke 30 minutes, and setting at 7 of the clocke 30 minutes) so that there when the Sunne hath declyned 7. degrees 49 minutes from the Equinoctiall, the day shall be an houre longer or shorter, and when it hath declined 3 degrees 54 minutes, the day shall be halfe an houre longer or shorter, &c. And furthermore, where the Pole is raised 49. degrees one minute, there the longest daye is 16 houres, and the shortest 8 houres long, the sunne rising at 4 of the clocke, and setting at 8 of the clocke, so that there when the sunne hath declined five Degrees 52 minutes from the Equinoctiall, then shall the day be an houre longer or shorter. And when the sunne hath declined two degrees 56 minutes, then the day shall be halfe an houre longer or shorter. &c. Yet furtherfore, where the Pole is raised 54 degrees 30 minutes, there the longest day is 17 houres, & the shortest leauen houres long, the

The Regiment for the Sea. 42

the sunne then rising at three of the clocke 30 minutes, & setting at 8 and thirtie minutes: then when the sunne hath declined 4 degrees and 41 minutes from the Equinoctiall, to the greatest declination, the day is an houre longer or shorter, and when he hath declined two degrees 21 minutes, the day is halfe an houre longer or shorter, &c. Where also the Pole is raised 58 degrees twentie 7 minutes, there the longest day is 18 houres long, and the shortest but sixe, and then when the sunne hath declined three degrees fiftie five minutes from the Equinoctiall, the day shall be an houre longer or shorter: and when the sunne hath declined two degrees lacking two minutes, then the day shall be halfe an houre longer or shorter. Furthermore also, where the Pole is raised 61 Degrees 18 minutes, there the longest day is 19 houres long, and the shortest but five houres: then shall the sunne rise at two of the clocke 30 minutes and set at 9. and 30 minutes, and then when the sunne hath declined three degrees, and 21 minutes from the Equinoctiall, then shall the day be an houre longer or shorter, &c. Furthermore, where the Pole is raised 63 degrees 22 minutes there the longest day is 20 houres long, and the shortest but foure houres, then shall the sunne rise at two of the clocke, and set at tenne of the clocke, and when the sunne hath declined two degrees and 56 minutes from the Equinoctiall vnto the greatest declination, then shall the day be an houre longer or shorter, &c.

Now where the Pole is raised sixtie 4 degrees 49 minutes, there the longest day shall be 21 houres long, and the shortest but three houres: and then when the sunne hath declined but two degrees. 36 minutes from the Equinoctiall vnto the greatest declination, the day shall be an houre longer or shorter. Where also the Pole is raised 65 Degrees, there the longest day shall be 22 houres, and the shortest but two houres long, and when that the

mi. then 7
longest day
is 17. hou.
long.

The Pole
raised 58
deg. 27
minutes 7
longest day
is 18 hou.
long.

The Pole
raised 61
deg. 18
minutes the
longest day
is 19 hou.
long.

The Pole
63. deg.
1 mi. the
longest day
20 houres
long.

The Pole
raised 64.
degrees 49
mi. the
longest day
21 houres
long.

The Pole
65 degrees
the longest
daye 22.
houres
long.

The Regiment for the Sea.

The Pole
66 degrees
20 mi. the
longest day
13 houres
long.

The Pole
66 De-
grees 32
minutes
then the
Sun shall
not set vn-
to them.

The Sun
cleane a-
boue the
Horizon
due north
and not to
appeare a-
boue the
Horizon
South at
noone.

To know
the length
of the day
at any
time in a
ny place
what the
day is.

Sunne hath declined but two degrees & 20 minutes from the Equinotiall, &c. then the day shall be an houre longer or shorter, &c. And where the Pole is rayled sixtie six degrees 20 minutes, the longest day shall be three & twentie houres long, and the shortest but one houre long, and then when that the Sunne hath declined but two degrees eight minutes, the day shall be an houre longer or shorter, and where that the North Pole is rayled sixtie six degrees and 32 minutes, there it is twentie 4. houres long, for that when the Sunne hath his greatest declination vnto the Northwardes, then at midnight, you shall see halfe the sunne, and when that the sunne hath the greatest declination vnto the south parts, then you shall see but halfe the sunne at none, and in going but fiftene miles further vnto the Northwardes, that is, but one quarter of a degree, then the sunne shall be cleane aboue the Horizon at the due North, and not scene vnto the South at none aboue the Horizon, the sunne hauing his greatest declination to the south, & then the day shall be an houre longer or shorter, when that the sunne hath declined one degree 57. minutes from the Equinotiall, and so forth vnto the greatest declination. And thus much haue I saide as touching the length of the day, wherby you may know at all times the true length of the day in any Latitude betwene the Equinotiall and the elevation of the Pole at 66 degrees and 32 minutes, by knowing how many degrees the sunne is declined, and that you may know on euerie day by the regiment going before, hauing this consideration, that if the sunne being vpon the Equinotiall, and hauing no declination, that then in any Latitude the day is alwaies iust 12 houres long. And you must note this, that it is called the day from the rising of the sunne, vnto the setting of the same vnder the Horizon, and not from day light vnto day light. For before the sunne rise, & after that the sunne is set, it is counted for no

no parcel of the day, but it is called the day light. And furthermoze, the day light will appeare by that time that the Sunne doth touch the 17 degree vnder the Horizon befoze the sunne rising, and also the day light will not be cleane gone vntill the Sun be moze than 17 degrees vnder the Horizon: for as you may perceiue here with vs at London, that when the sunne hath his greatest declination vnto the Northwardes in June, that the day light remaineth all night, for that the Sunne goeth not vnder the Horizon, but 15 degrees.

The xii. Chapter is of the North STARRE.

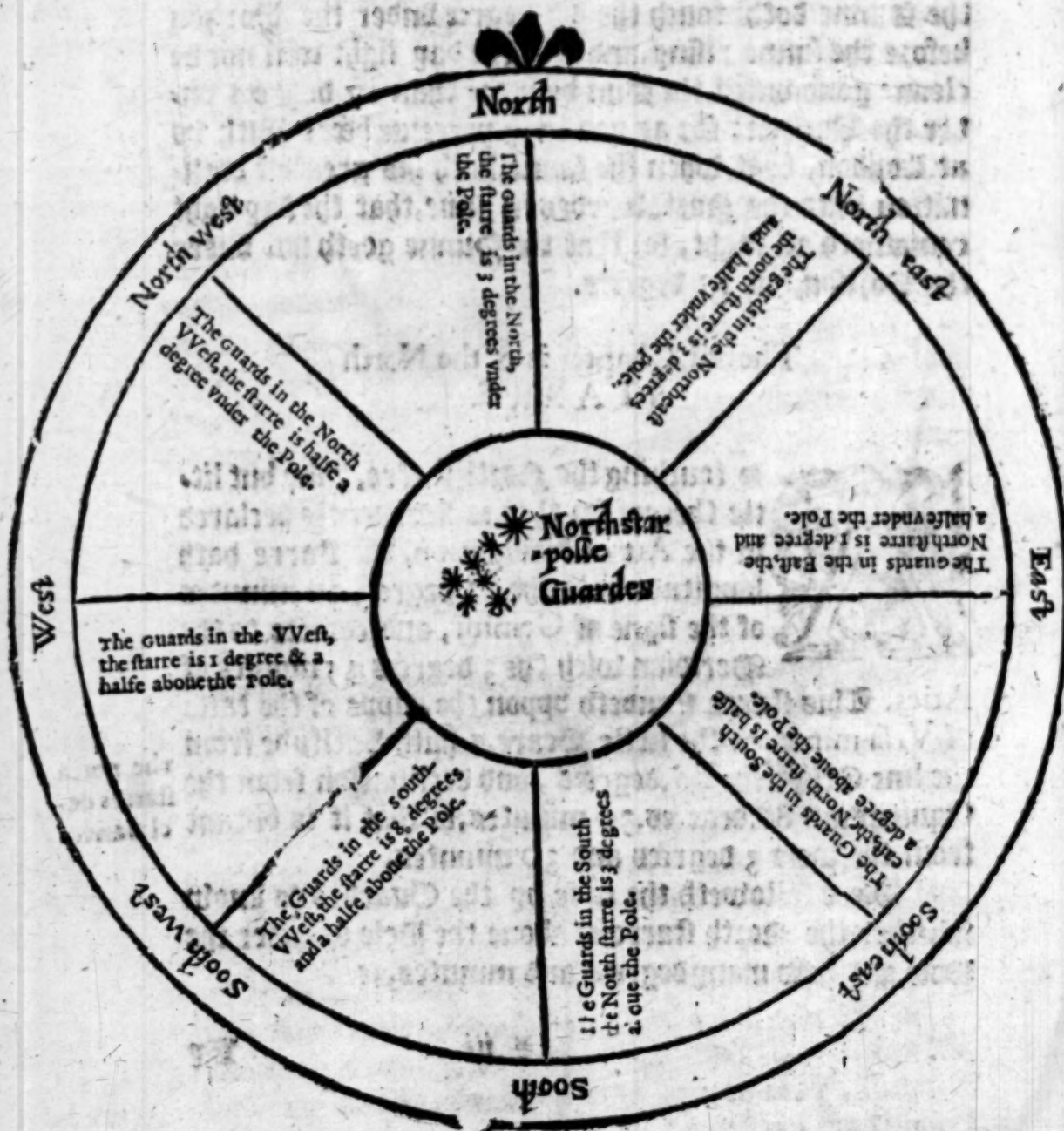


As touching the North Starre, I say but little thereof, for that is sufficiently declared in the Art of Nauigation, the starre hath longitude vnto the 21 degree, 30 minutes of the signe of Gemini, and cometh to the Meridian with the 3 degrees 45 minuts of Aries. This starre standeth vpon the tippe of the taile of Vrsa minor, or the little Beare, & hath Latitude from the line Eclipticke 66. degrees, and declination from the Equinotiall 86. degrees. 30 minutes, so that it is distant from the Pole 3 degrees and 30 minutes.

the north
starres de-
clination.

Here followeth the note by the Guardes to know whether the North Starre be aboue the Pole or vnder the Pole, and how many degrees and minutes, &c.

The Regiment for the Sea.



B observing of that, which is set downe in the former figure we may readilie finde the height of the Pole, the height of the North Starre being also knowen. For if in taking the height of the North Starre, we finde the guards to beare from it west south west, south or southeast, then from the height of the Starre we must subduct so much as by this figure we finde the Starre to be aboue the Pole, the remainder expresseth the height of the Pole. But if in taking the height of the North Starre we finde the guards to beare from it east, northeast, North or north west, then vnto the height of the Starre we must adde so much, as by the former figure we finde the Starre to be beneth y^e Pole, the totall summe expresseth the height of the Pole. Furthermore by 2 severall Altitudes of the North Starre or anie other Starre which doth neuer arise or set, the height of the Pole may be found in this manner, take the height of the saide Starre when it is at the heigest in the Meridian, take also the height of the same Star when it is at the lowest, adde both the heights together, the halfe of that number expresseth the height of the Pole: But this must be noted that the heights severall taken must be counted from the same side of the Horizon,

The 13 Chapter doth shew you by the sayling vpon the quarter of your Compasse, in how farre sayling you doe raise a degree, and what you do depart from the Meridian, and in the ende there is a demonstration thereof: reckning it as you doe saile vpon a flat, but not Spherall.

Furthermore, because there be some that desire to know the alteration of a point, to this ende, that in running vpon any point, they may knowe how much they rayse

X

The Regiment for the Sea.

In going
South-
wardes
you raise
the Equi-
noctiall, &
lay Pole.
In going
to the
North-
wardes
raise the
Pole and
lay the E-
quinoctiall.

or lay the Pole lower vppon one point then vppon an other, I haue therfore thought good to set the matter downe briefely in this chapter : In going to the North, you doe raise the Pole, and lay the Equinoctiall : contrarywise, going towards the south, you lay the Pole, and raise the Equinoctiall. But in sayling or going East or West, you doe neither alter your Pole nor Paralel, but onelie your Meridian. Whereas in sayling vppon any other point sauing south and North, you do alter both your Pole & Paralell, and also your Meridian. Wherefore I will open vnto you (in sayling vppon one of the quarters of the compasse) what distance vpon euery point both raise or lay one degree, and how many miles you are distant from the Meridian of that place from whence you departed.

But here is one thing to be noted (as I suppose) in y^e most part of cards they allow for euery degree, but 17 leagues & a halfe. Your cards be most commonly made in Lishborne in Portugal, in Spaine, or else in Fraunce. But as I take it, we in England shold allow 60 miles to one degree, that is, after 3 miles to 1 of our English leagues, wherfore 20 of our English leagues shold and were to one degree; for y^e 3 of our miles will not make 1 of their leagues, & because they make their accounts by their leagues in y^e Cards, and not by ours, therfore I will shew you by our English miles. An English myle contayneth a thousand paces, and euery pace 5 fote, and euery fote 12 ynches. Now some thinke that a pace cannot be 5 fote, but a pace Geometricall is two reasonable steppes, for it cannot be a pace, vntill the hinder fote be remoued forwardes, & those two steppes will containe 5 fote, and so may any man endure to goe at pleasure. But now to our purpose. For the sayling of one quarter of the Compasse, this is to be noted. First that in sayling directly south or North, you do raise or lay the Pole a degree in 3 score miles going. In y^e altering of one point from the South or North in thre score
and

X
Of english
leagues &
Spanish
leagues.
A degree
is 60 miles
or twenty
English
leagues.

and one miles : and you be departed from the lyne of the East and west, or the Meridian 12. miles. In altering of the second point, you raise a degree in sayling three score and five myles: & depart from your Meridian 25. miles. In altering of the third point, you doe raise or lay one degree in sayling three score and 12 myles, and a 9. part: & are departed from your Meridian 40 miles.

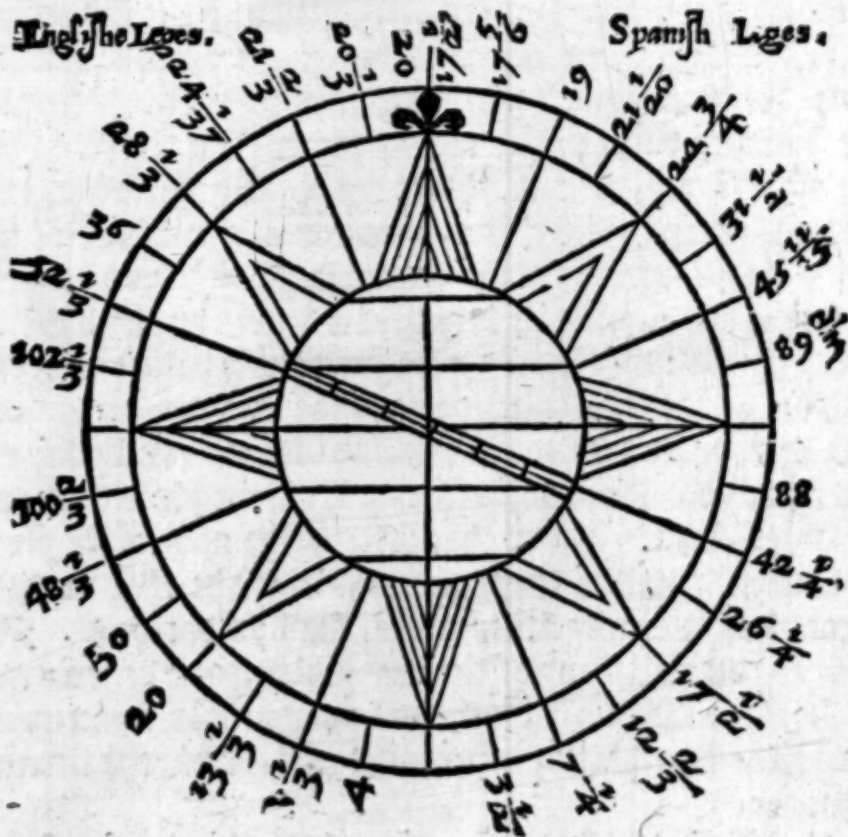
Moreover, in altering of the fourth point, you do raise or lay a degree in the going of foure score and five miles : and depart from your Meridian three score myles. In altering of the fifth point or winde, you raise a degree in the sayling of 108 myles: and depart from your Meridian foure score and tenn myles. In sayling by the sixth point, you raise or lay one degree in 157. miles : & depart from your Meridian lyne 145. miles. Last of all, in sayling by the seauenth point or winde, you doe raise a degree in going of 308 myles : and depart from your Meridian line 302 miles: and after this maner you may consider of the other three quarters of the compasse. But if you require to know the raising or laying of a degree by the leagues of the Cards : that is, at 17 leagues and a halfe : then behold the figure following, or read the Art of Nauigation, and there shall you finde how many degrees you be departed from your Meridian, and also from the place that you departed from : and yet that serueth for none other place but onely for vnder the Equinotiall, for he that maketh account of it in any other place, shall be deceiued. For euer as you goe to any of the two Poles, your degrees still be shorter & shorter, till such time as your Meridian meete vnder the two Poles, whereof I intreate in the sixtene Chapter.

For the better vnderstanding of the things aforesayd, looke on this figure following. In the which figure you are to note this, that the numbers which are set vpon the uppermost quarter of the circle towards y left hand expresse

A note to know in how farre sailing you do raise or lay a degree in the sayling by any one point of y compasse.

The Regiment for the Sea.

the English leagues which we must runne vpon each seuerall point of the compasse befoze we can raise oꝛ lette fall the Pole a degré. The other numbers on the right hand are the Spanish Leagues seruing to the same purpose. The numbers set on the nethermost quarter of the circle towards the left hand, expresse the distance in English leagues from the Meridian, when we haue rayled, oꝛ let the Pole fall a degré, but those on the right hand are the Spanish Leagues expressing the same distance.



The 14. Chapter teacheth to know how farre any lande is off from you, knowing but the distance betwene any two places: whether you run along by the land, or directly to the shore, or otherwise, with other necessarie things.



For that I know it very necessary & profitable for Sea-men to know how nere or farre they be into the Sea, and how nere to the land, I will entreate thereof for diuers considerations. And first, because in running alongst y^e land ther may

be danger, which may be such a certain quantitie into the sea, that they may go both within them & without them. And also in like maner, for that being at one distance from the land, y^e land may rise in such a shape or fashioⁿ, whereas being nere, the land may rise in an other forme or fashioⁿ: for being farre off, you shall see the hills within the land, & being nere, the hills or cliffes nere vnto the Sea coast, may take away the sight of the land within.

Furthermo^{re} also it is very necessary, to know in what fashioⁿ the land doth rise vpon diuers points of the compasse, as oft as the fashioⁿ of the land doth alter, & to note it in some booke for remembrance. First by what points of the compasse, then the fashioⁿ, & last, at how farre off, &c.

For knowledge how far off you be from the land, you may haue this help, if there be any two places by the sea coast, whercof you know the distance, how many leagues or miles the one is from the other. In going alongst the coast you shall sette them with your compasse, and when you are thwart of them, if they be but one point asunder, you shall be fve times the distance betwene the from

A note for the lād rising in diuers shaps or fashioⁿ. To know how farre the land is from you where two lands bee but one point asunder.

The Regiment for the Sea.

the land or shore. If the two places be two points asunder, then the distance vnto the shore, shall be two times and a halfe the distance. If 3 points asunder, then the distance vnto the shore shall be once the distance & a halfe. If foure points asunder, the same distance shall be betwene you & the shore, that is betwene the two marks. If five points asunder, then is it vnto the shore but two third parts of the distance betwene the two places. If six points asunder, (you being thwart of one of them) then shall the distance vnto the shore be, not halfe the distance betwene the two places. And in all these cases before rehearsed, the one place must be thwart of you, the other must be a head or sterne of you: & so it is exact and true. As for ensample this: I (going alongst by any coast) doe know before hand, how the one place doth beare from the other, besides this also I know the distance, that is to say, how many leagues they be asunder. As for ensample, the two places assigned beare East and West the one from the other, I then (knowing that they be three leagues asunder) when I haue brought one of the places South or North of mee, doe set them with my compasse, the one being North of mee, and the other bearing North and by East, that is one point asunder: Now the distance vnto the shore being five times the distance betwene the two places which be three leagues asunder, I know the shore to be 15 leagues from mee, which (if the places were but one league asunder) should be but five leagues from the shore.

Of 2 places to be one point asunder.

To be two points asunder.

3. points

Furthermore, if the places be two pointes asunder, that is to saye, the one north, and the other north north east, then shall the distance vnto the shore be 7 leagues and a halfe from mee. Whereas if the two places were but a league asunder, it should be but two leagues and a halfe vnto the shore. And furthermore, if the places be three points asunder, that is to saye, the one north, and the

the other northeast & by north, the distance vnto the shoze ^{asunder.}
shalbe foure leagues and a halfe: whereas if the two pla-
ces were but one league asunder vnto the shoze, it should
bee but a league and a halfe. If foure points asunder, ^{4. points}
that is to say, if the one place be due north and the other ^{asunder.}
place northeast, then it is vnto the shoare three leagues
iust. If but one league asunder, then but one league vn-
to the shoze. Moreover if the two places be five points a-
sunder, that is to say, the one north, and the other north- ^{5 points}
east and by East, then the distance vnto the shoze shall be ^{asunder.}
but two leagues: whereas if the two places were but one
league asunder, vnto the shoze should be but two miles.

Last of all, if the two places be 6 points asunder, that is ^{6. points}
to say, the one North, and the other East northeast, then ^{asunder.}
it shall not be a league and a halfe vnto the shoze, &c. But
if you come directly to the landwards, hauing no cause to
be thwart of none of those knowen places, then to know
how farre you be from the land, you must doe as is by the
places before spoken of. For if you goe in due North, the
one place being North and by west, and the other North
and by East, then (the two places being three leagues a-
sunder, you shall be 7 leagues and a halfe from the shoze:
so that if you runne into the shoze due North, vntill they
be foure points asunder, that is to saye, the one North
Northwest, and the other North northeast, then it shall
be vnto the shoze three leagues, and three quarters.

And furthermore, you still running in due north till the
two places be six points asunder, that is to say, the one
place to be northwest and by north, and the other place to
be northeast and by north, the distance vnto the shoze shal
be two leagues and a quarter. And againe, if you runne
in due north, vntill they be eight points asunder, that is
to say, the one place Northwest, and the other northeast:
then the distance vnto the land or shoze, shall be but halfe
the distaunce betwene the two places, that is, but one

¶.iii. league

Of going
or sailing
right into
the shore.

The Regiment for the Sea.

league and a halfe. Lastly, if you runne to the land due North, untill the 2 places be 10 points asunder, that is to say, the one place North-west and by West, and the other North-east and by East, then the distaunce vnto the shore shal be but one third part of the distance betwē the two places, that is, but one league from the land, &c. Thus much haue I saide as touching the bearing of the lande from you, by the points of the compasse, to know the distance, or how farre the land is off: which is very necessarie for Seamen to know, for diuers considerations, as I sayd before.

Away to know how one head land beareth of another.

If now therefore you know not how one head-lande doth beare from another, doe thus: in running alongst the Coast, when you see the appearing of any lande one before another, set them with your compasses, and looke how they beare from you, by what point of the compasse, and so shall you know iustly how the one land doth beare or lye from the other. And by this order you may correct your plats, by doing this, as often as you see two notable places together: as Ilands, rocks, head-lands, mouthes of hauens, sandes, or whatsoeuer else be worthe of noting, this done, as often as you doe see them together, set them with your compasse, and that will shew you most certainly, that so they doe beare the one from the other.

To know the distance at Sea betwene any two head-land.

You may know the distance in lyke manner betwēne them, if you know your shippes way, as thus: when you first see any two places together, as two head-lands, or two Ilands, hauing sette them with your compasse, and knowing how the one beareth from the other, then for that you will not come neare vnto them, you doe hale off from the land untill that you haue brought your selfe farre inough off, at your discretion, and when you be thwart of the first head-land, sette the other land, and consider how it beareth from you: then reckon your ships way, how many leagues the shippe might goe, untill you

you come thwart of y^e other head-land, keeping your course along as the two head-lands beare, and so shall you both know the distance betwene the two places, and also how farre you be off from them. In like manner, hauing con- sideration of the distaunce betwene the other places that you haue obserued, both by your compasse, & also the Ships way, you may know how farre it is to the shore, going right to the land-wards, by your crosse staffe, although you know not the distance betwene any two places.

To know
how farre
it is vnto
the land
an other
way.

As thus: take the widenesse betwene any two places with your crosse staffe, bearing right to landwards, and then remoue the crosse staffe, or Transuersarie, halfe the length of the transuersarie, that is to saye, the ende next vnto you, and then by running in till the two endes of the transuersarie doe agree with the two markes, you shal be halfe way to the shore: then looke how farre the ship hath gone in y^e time, for the same distance is vnto the land from the shippe. But if you remoue the Transuersarie but a quarter y^e length there of the transuersarie to you wards, then at the place where the end of the transuersarie doth agree with the two markes, shall be one quarter of the distance betwene the shore and you at the first obseruation: and it shall be thre times the quantitie vnto the shore, &c.

As I doe farther shew the conclusions of the Crosse staffe in my Booke called *The Treasure for Trauailers*, the first booke the 10. 11. 12. 13. and 14. Chapters. And to know the Shippes way, some doe vse this, which (as I take it) is very good: they haue a peece of wood, and a line to bere out ouer board, of a great length, which they make fast at one ende, and at the other ende, and in the middle, they haue a peece of a line, which they make fast with a small thread to stand lyke vnto a crow foote: for this purpose, that it should driue a stearne as fast as the ship doth go away from it, alwaies hauing y^e line so readie, that

To know
the ships
way.

The Regiment for the Sea.

that it goeth out so fast as the shippe goeth.

An english
league is
2500. fa-
dame.
A Spanish
league is
2857. fa-
dame.

Additiōs.

In lyke manner they haue either an houre glasse of a minute, or else a knowen part of an houre, by some number of words or such other like, so that the line being verred out, may be stopt iust with that time that the glasse is out, or the number of words spoken, which done, they hale in the logge or parte of wood againe, and looke how many fadame the ship hath gone in that time: that being knowen, what part of a league so euer it be, they multiply the number of fadames, by the porcion of tyme or part of an houre. Whereby you may know iustly how many leagues and parts of a league the ship goeth in an houre, &c. As for example this: I hauing a minute glasse, but it is better for to haue a porcion of tyme by some number of words, and the lesser part of time that you haue, it is the better, for if that the shippe doth goe very fast, you shall not haue to much lyne out, and if that the ship doeth go but slowly, then you may double the length of tyme by speaking the words twice or thrice ouer, and for to work it truely doe this. First let downe your logge handsomely into the water, and then let the line be marked according vnto the shippe, a two or three fadame from the log accordingly, that it be so farre a stearne that it cometh into quick water, that the edie of the stearne doth not stay it, that being done, then begin to speake your words, and stay it iust at the ende of the words, and then hale in your logge againe, and measure how many fote or fadames that you haue verred or put out in that time, and suppose that your porcion of time is a 120 parte of an houre, more or lesse it maketh no matter, so that you doe know the iust porcion of time.

And suppose that you haue verred five and twentie fadames in the hundreth and twentie part of an houre, therefore multiply a hundreth and twentie by five and twentie, and of that multiplication there cometh 3000 fadame

fadame, and now an English league is 2500. fadame, so that the shippe hath gone one league and 500 fadames in an houre, and the said 500 fadames is the fifth part of a league, so that the shippe hath gone one league and one fifth part of a league in an houre. And this by multiplying the portion of time by the number of fadames, you may keepe a verie good reckning of your ships way, having this consideration, that you doe make as often times p^{ro}ve as the winde doth increase or decrease.

And for a good order in the keeping your account, doe this: Look how long time that the winde hath blowne steddelly without any increasing or decreasing, or altering of your course, then when that you doe see what or how many fadames that the shippe hath gone in an houre, multiplie the said number of fadames by so many houres as the shippe hath gone by the saide winde, and then divide all that summe by 2500 or else it is better to adde all your number of fadames as long as the shippe hath gone one course without altering: as for ensample this. The shippe hath gone foure houres 25 fadame, in $\frac{1}{4}$ time of 120 part of an houre, that is in 4 houres. 12000 fadame, and the Winde encreasing, she went three houres 34 fadams. In 120 part of an houre, that is in 3 houres 1224 fadames and the Winde decreasing, the shippe went five houres, but 16 fadames, in the 120 part of an houre, that is. 9600 fadame in five houres, now adde all these numbers of fadames together, that is. 12000 and 12240 and 9600. and all these make 33840. So that the shippe hath gone in 12. houres 33840. fadames, and now divide this summe by 2500. which is a league, & then there will stand 13 in the quotiente, and 1340. remaineth over. So that you may conclude, that the shippe hath gone thirteene leagues and a halfe, and 90 fadames: and by this meanes you may keepe a verie good order in your recokning, and so note it in your booke, and make a marke in your Cart,

P.

et. And

The Regiment for the Sea.

cc. And this is to be noted, y a Spanish or Portugal league doth containe 2857 fadames, and an English league but 2500. fadames.

The 15. Chapter or Rule, treateth of the Longitude &c.



Altering
the time
of rising &
setting of
y lightes.

Altering
y aspects.

NOW some there be that be verie inquisi-
tue to haue a way to get the longitude,
but that is too tedious for seamen, for that
it requireth the deepe knowledge of Astro-
nomie. For this they must consider, that
the whole frame of the firmament is car-
ied round from the East to the West, in 24 houres, so as
there remaineth neither light nor marke, but goeth round,
sauiing onely the two Poles of the world; and these two
stand alwaies fast. But as I said before in the ninth rule
of him that going south or north, doth raise or lay the pole,
and in like case the Equinoctiall altering his Paralell,
and causing the light of the Firmament to alter y time
of their shining or abiding aboue our Horizon: so he that
goeth directlie East or West, doth neither raise nor laye
the Pole, so that still the lights of the Firmament doth
make one manner of Arch, according to their Latitude or
declination: but the going East or West doth alter the
Meridian, causing the Planets to haue their aspects at
another houre or time, altering the time of the chaunges
of the Moone: and also the time of the Eclipses: which is
necessarie for all traualers by sea or by land. Therefore
I thought it needefull to be spoken off: for as countries
haue Latitude from the Pole, so in like maner they haue
an appointed Longitude, you may get the Latitude with
instruments, but the Longitude you must bring from an-
other

other place, which you cannot do but with a Globe or else
a Mappe or Carde, and then you must measure from the
Meridian of the Canarie Ilands, otherwise called the
fortunate Ilands. And in our Latitude of London, euerie
555 miles which containeth 15 degrees, will answere to
one houre of time: and vnder the Equinotiall 900 miles
to 15 degrees: the degrees be as long as the degrees of la-
titude, but towards the Pole fewer and fewer, till they
come to nothing vnder the two Poles, with vs at Lon-
don 37 miles will answere to one degree of Latitude the
pole being raised betweene 51 and 52 degrees. The cause
why the longitude was fetched from the Canarie Ilands,
I know not, but it was as I suppose, because it was the
Westermost place then known: For Ptolomeus was the
first that ordained that rule.

Of Lat-
tude and
longitude.

15 degrees
is an hour
of time &
an london
it is 555
miles.

Longitude
beginneth
at the Ca-
narie I-
lands,

Now furthermore, because you shall know this thing the
better, I haue set forth in my 2 booke, called y^e Treasure
for traualers, certain principall places in y^e whole world,
both according to their Longitude and Latitude, whereby
which you may know what manner of Arch the sun with
the other lights doth make, and also by the Longitude you
may know at what time the Moone doth make any aspect
with any of the Planets. Besides this, you may know the
Eclipses of the sunne or Moone, with the change quar-
ters, & full Moone in all places are the verie true houre
and minute of time of the Diameter. If you haue a true,
and an exact Ephemerides, & consider diligentlie for what
Longitude or place your Ephemerides was made. The
Longitude may be found at the time of the Eclipses of
the Moone, so that she be aboue your Horizon in any place
vpon the superficies of the earth, or Sea in this manner.

To know
the true
time of y^e
aspects of
y^e Moone

Seeke out in the Ephemerides, the time of the Eclipse,
obserue, also diligentlie the iust time, wherein you see the
Moone Eclipsed, compare the saide time with the time
sette downe in the EPHEMERIDES, if they

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doe both agré, then are you in the same longitude, and vnder the Meridian of that same place for the which your Ephemerides was made. But if the 2 times compared together doe differ, then are you either to the East or westwarde of that place for the which your Ephemerides was made. If that the time wherein you obserued the Eclips be lesser then that, which is set downe in the Ephemerides. Then are you to the westwarde, but if it be greater, then are you to the Eastward of that place, for which your Ephemerides was made. How much you are to the East or westwarde may easilie be knowen by the difference of time and the degrees of Longitude answerable thereunto. Unto euerie houre there are ascribed 15 degrees to euerie halfe houre 7 degrees and $\frac{1}{2}$ and so consequently following that rate as the difference of time is moze or lesse. If the time noted in the Ephemerides doth differ an houre from y^e time of your obseruatiō, the doth y^e place wherin you obserued y^e Eclips differ in longitude from that place, for the which the Ephemerides was made 15 degrees, if two houres, then is the difference of longitude 30 degrees, &c. These degrees answerable to the difference of time and expressing the difference of Longitude must be subducted if your obseruation of the Eclips were made to the westwarde, otherwise they must be added to the longitude of of the place, for the which the Ephemerides was made, so shall you finde the true Longitude of the place in the which your obseruation was made.

And furthermore you might knowe your Longitude with the Ephemerides, by the coniunction of the Moone with other fixed starres, if it were not for one great infirmitie, & y^e is the paraller of the Moone, which the Semidiameter of y^e earth doth cause, by néerenesse of the Moone vnto y^e earth: wherfore I would not haue any man thinke that the Longitude is to be found at sea by instrument. Therefore let no seamen trouble themselves with any
such

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such rule, but (according to their accustomed manner) let them keepe a perfect accompt and reconing of the way of their Shippe, whether the Ship goeth to leeward, or maketh her way good, considering alwaies what things be against them or with them, as tides, currents, windes, or such like.

The Longitude is not to be gotten with instruments on the sea

The xvi. Chapter sheweth how many miles will answer to one degree of Longitude, in euerie severall Latitude, betweene the Equinoctiall and any of the two Poles: with the demonstration for that purpose, and the diuersities of aspects of the Moone.



NOW by this rule shall I teach you how many miles will answer to one degree, for euerie severall latitude betwene the Equinoctiall and any of the two Poles either Arctick or Antarticke. And first vnder the Equinoctiall, (the two Poles being even with the Horizon) 60 miles doe answer to one degree, as I said in the 15 Chapter.

And now shall follow the rest. Where the Poles be rayled 21 degrees 56. miles belongeth to one Degree of Longitude. Now the Poles being raised 29 degrees 52 miles doe answer to one degree. The Poles being rayled 36 degrees 48 miles doe answer to one degree. The Poles 42 degrees rayled 44. miles goeth to one degree of longitude. The Pole raised 48 degrees 40 miles to one degree. The pole raised 53 degrees 36 miles to one degree. The Pole raised 57 degrees 32 miles to one degree. The Pole raised 62 degrees 28 miles to one degree. The Pole raised 66 degrees 24 miles to one degree.

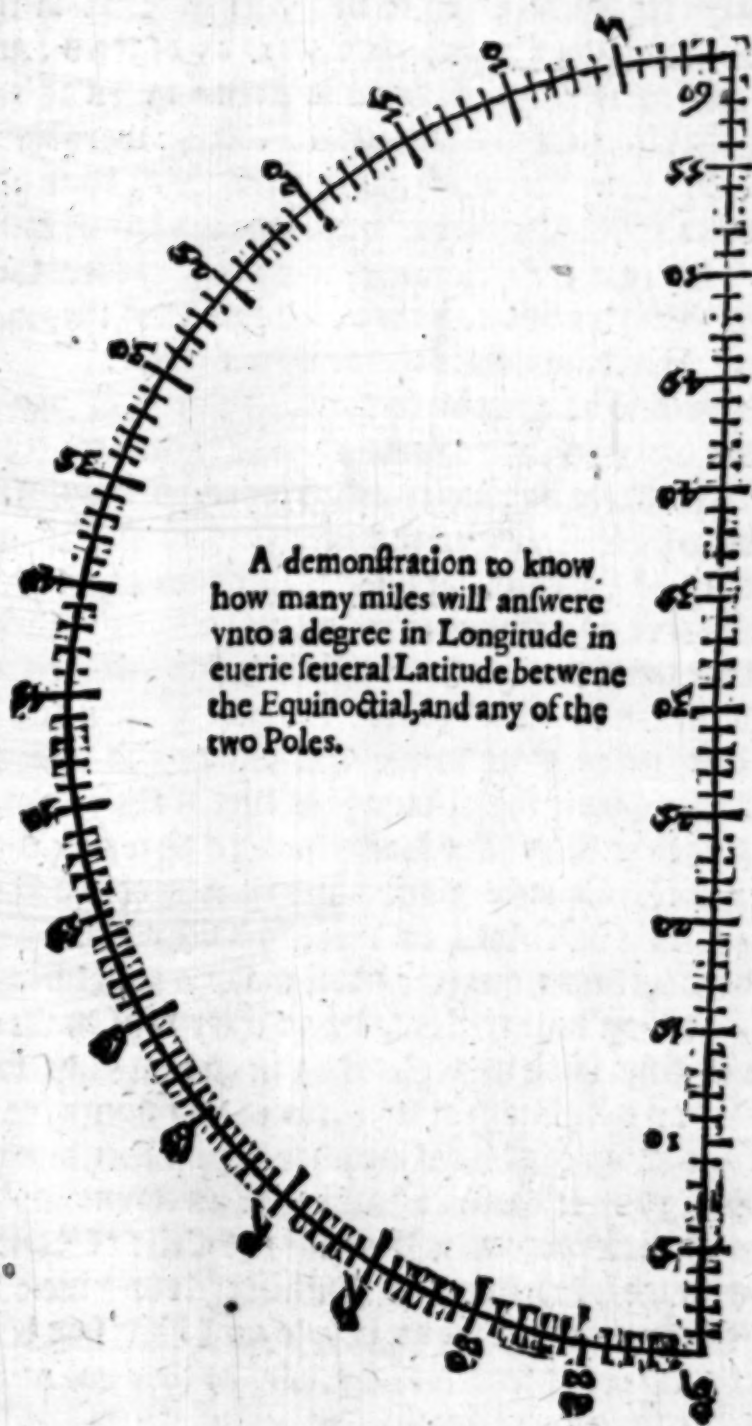
Alit.

The

The Regiment for the Sea.

The Pole raised 70 degrés 20 miles to one degré.
The Pole raised 74 degrés. 16 miles to one degré. The
Pole raised 78 degrés. 12 miles to one degré. The pole
rayed 82 degrés. 8 miles to one degré. The Pole ray-
sed 86 degrés. 4 miles to one Degrée. The Pole being
rayed to the highest at 90 degrés (being then your Ze-
nith) there all the Meridians meete. And now shall folow
a demonstration of halfe a circle, and that shall shew you
how many miles will make a degré, according unto eue-
rie Latitude that you are in, by the applying of the one
foote of a payze of Compasses, or by making a threed fast
to the lower corner the halfe circle at 90. & by extending
of the other foote of the Compasse, or by laying the threed
bpon the latitude of the place wherein you are, y^e which
latitude or eleuation of the Pole is marked by seuerall
degrés in the halfe circle, and in the Diameter are mark-
ed, the miles answereing to euerie Degrée. Your com-
passes therefore being extended, or the threed being ap-
plied from 90 to the Latitude of the place wherein you
are, turne the Compasses or the threed downeward to
the Diameter, for the number vpon which the foote of the
Compasses, or the ende of the threed lighteth, expresteth
the miles answereable to each degré of Longitude in the
Paralel of the Latitude propounded. The reason is this,
because all Circles be in proportion correspondent vnto
their Diameters.





The Regiment for the Sea.

15 degrees
answereth
vnto an
houre of
time.

Now you must consider (as it was partly noted before) that vnto euery houre of time in the chaunging of the Moone or of the Eclipses, you must allow 15 degrees, and vnto euery degree you must allow so many miles as you doe see in your former instrument to be answerable to the Latitude of the Countrey, in this manner: those places that be to the Westwards of your towne, place or countrey, by 15 degrees, the Moone shall change rather with them then with you by one houre, because that they shall touch your Meridian before theirs by one houre.

And if the towne or place be to the Eastwards of you by 15 degrees, then shall the Moone change rather with you than with them by one houre, as for ensample thus. If so be that with vs at London the Moone shall change vpon any day at 12 of the clocke at none 5 minutes to the westwards as farre as Lisbon in Portugall, the Moone shall change that same day at 11 of the clocke 43 minutes, the longitude being thereof from the Canarie Islands five degrees 36 minutes. Now to the Eastwards, the same day at Rome the Moone shall chaunge at two of the clocke 31 mi. because that they haue Longitude 36 degrees 40 minutes from the Canarie Islands, and then by this account 7 degrees and a halfe will answer to halfe an houre, and then 3 degrees and 3 quarters will make a quarter of an houre, and then nine miles and a quarter will make one minute of time with vs at London in our latitude, so by this rule you may know at what time and minute the Eclipses or chaunges of the Moone doe happen, knowing for what place your Almanake was made, as commonly we here in England doe make them for the Citie of London.

To know
the true
time of the
change &
quarters

Thus much haue I sayd as touching the true time of the chaunge of the moone, for some people (as I haue said before in the 3 chap. do contemptuously say, why do they not giue or make rules for euery, to know the houre & mi. of the change, full, & quarters of the moone: And yet they be utterly boide of any knowledge

knowledge in y^e mathematical science, wherby they might know y^e true time of y^e change of the Moone: For it is a question Astronomicall, to know the Moones motion: a question Geometricall, to know the true time of the aspects, or measure betwene the Sunne & the Moone: and thirdly, it is a question Cosmographicall, to know the true Longitude of the place he is in, at the time when the Moone chaungeth, &c.

of y^e moon
is a questi-
on Astro-
nomicall,
Geometri-
cal, & Cos-
mographi-
call.

Now followeth the next rule which shal treat of Longitude and Latitude.

The seuententh Chapter sheweth the Circumference of the whole Earth and the Sea, vnder sundry Parallels, whereby that any Sea-man may know what quantitie or part of the earth that he hath sailed or passed by the number of leagues, and also he may know the alteration of time. &c.



AD now furthermore I doe think it necessary for to shew the Circumference of the whole earth, in sundry Latitudes from the equinoctial, wherby in sailing you may know what quantitie or part of y^e whole earth that you haue passed or gon, & also what the diuersitie, aspect, or time is wherein you haue transported your selfe from any place assigned, which is necessary for them that should goe any long voyage.

Under the Equinoctiall the whole earth is in circumference 7200 leagues, attributing 20 leagues to a degree, and the halfe thereof is 3600 leagues, wherein that Paralell it is mid night to one, when it is high none to another, and the quarter of the compasse is 1800 leagues, and there the diuersitie of time is altered six houres, and

W.

then

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then in 900. leagues the time is altered three houres : so that in the sailing East or West under the Equinotiall 300 leagues, shall alter one houre of time in the Eclipses or the chaunges of the Moone, &c.

Furthermore, where the Pole is raised 20 degrees above the Horizon round about the earth keeping the paralell, the whole compasse is 6766 leagues, and the halfe of it is 3383 leagues, and there your none is midnight, and then a quarter of that Paralell is 1691. leagues and a halfe, and there the alteration of time is six houres, & then 846 leagues doth alter three houres of time, so that 282 leagues doth alter one houre, in the change or Eclipses of the Moone, &c.

In the Latitude of 30 degrees from the Equinotiall, the compasse of the earth vnder that Paralell is 6236 leagues, and the opposite part in that Paralell is 3118 leagues, and there none is midnight, and then the quarter of the compasse of the earth is 1559 leagues, and then passing in that paralell 779 leagues and a halfe, doth alter three houres of time: so that 260 wanting $\frac{1}{2}$ leagues shall alter one houre in the aspects of the Moone, and also in the Latitude of 40 degrees from the Equinotiall, the whole compasse of the earth and sea vnder that paralell is 5516 leagues : So the halfe is 2758 leagues, and a quarter is 1379 leagues, so that 689 leagues and a halfe, shall alter three houres of time, and 230 leagues, will alter one houre of time in the Eclipses or aspects of the Moone, &c.

Where the Pole is raised 50 degrees, there the circumference of the whole earth vnder the paralel is 4628 leagues, and the halfe thereof is 2314 leagues, and the quarter thereof is 1157 leagues : so that 578 leagues & a halfe, doth alter three houres of time : and 193 leagues doth alter one houre of time in that paralell. In the Latitude of 60 degrees from the Equinotiall in that paralell,

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tell, it is but 3600 leagues, to go round about the whole earth & sea, so that 1800 leagues is the opposite part of that paralell, and there your none is midnight, so that 900 leagues shall alter six houres of tyme, and 450 leagues, three houres of tyme, and 150 leagues shall alter one houre of time in the aspects of the Moone, being the 24 part of the compasse of the earth, in that paralel, &c.

Where that the Pole is raised 65 degrees, there the circumference in the paralel is 3042 leagues, so that the halfe is 1521 leagues, and a quarter of that paralel is but 760 leagues and a halfe: So that 380 leagues shall alter three houres of time, and 126 leagues and $\frac{1}{2}$ shall alter one houre of tyme, &c.

And also in the latitude of 70 degrees, the compasse of the earth is in the paralel 2462 leagues, so that the opposite part is 1231 leagues, & the quarter is 616 leagues and a halfe, so that 307 leagues and three quarters, doth alter three houres of time, and 102 leagues will alter one houre in the Eclipses or change of the Moone. And furthermore, in the Altitude of the Pole 75 degrees, there the compasse of the earth in y paralel, is 1864 leagues, & the halfe is 932 leagues, & the quarter is 466 leagues, so y the alteration of three houres of time is 233 leagues, and 77 leagues & two mile will alter an houre of time &c. And also in the Latitude of eightie degrees from the Equinoctiall, there the whole circumference of the earth under that paralel is but 1250 leagues. And the opposite part in that Paralell is 625 Leagues, and then the quarter of that, is but 300 & 12 leagues & a halfe, so that 156 Leagues will alter three houres of tyme, and five and twentie leagues will alter one houre, in the time of any Eclipse or any aspects of the Moone, so that you may see how short that the Circumference of the earth is, at the Latitude of eightie degrees: and this I do cease to shew any further towards the Pole-wards, so that it is

The Regiment for the Sea.

doubtfull whether that it is *Paugible* so néere vnto the Poles, &c.

¶ The eighteenth Chapter or rule, sheweth how to sayle by the Globe.

You can-
not draw
the land &
sea true vp
pon a flat
thing.

To make
a sea plat
or Card,

NOW to sayle by the Globe, it is conuenient to be spoken off: For that generally the most part of the Sea-men make their account as though the earth were a flatforme. For they doe not consider that the earth is a Globe, and that the Meridians doe grow narrower and narrower towards the Poles, for it is vnpossible to draw the face of the earth and the Sea true vpon a flatforme, for if you will describe the lande true, then shall not the Sea be true if your lines be made according to the arte of Hydrographie, for the Sea shall be broader to the North partes than it is, because the Meridians grow together. Now if you would describe the Sea true, with lines, courses, distaunces, hauiens and daungers, then should your land be broader to the North parts than it is. As for ensample thus: England & Scotland being both one Island, in all your cardes of Paugation, that doth shew any part to the Southwards, the North part of Scotland is drawn much bigger than it is, for otherwise the lynes of South & North should not be according to the trenting of the land, for if you beu it well, you shall finde the North ende of Scotland much more in distance than it is. As you may see in measuring it by the trunk of your carde.

For your better vnderstanding, I haue shewed the compasse of the earth vnder sundry Latitudes in the chapter going befoze, and by that you may see that the compasse of the East & West lyne (comming from the Equinoctiall)

noctall) is much lesser to the Northwards, than it is to the Southwards. Wherefore when you shall haue any occasion to attempt any boiage to the Northparts, it is best to sayle by a Globe: soz so shall you better see the distances and bignesse of the lands, and in lyke maner your lynes and courses. In this order, first (according to the accustomed manner) keepe a perfect account and reckoning of the way of the ship, by what lyne or point your ship hath made hir way good, then must you resort to your Globe. After that consider what place and paralell you be in, which you may doe by the sunne by daye, and by the starres by night. Now (knowing what place and Paralell you be in) sette your Globe to the eleuation of your pole: that done, turne to the place of your Zenith, and seeke the opposite of it in your paralell: soz then you know that in the same Paralell is your East and West lyne: that had, the iust quarter of that circle to the pole, must be deuided into the eight points of your compasse, doeing so lyke wise on the other side.

How to
use y globe
to direct
your cours
& to know
how that
any place
doth beare

In lyke case if you come to the Southwards, deuide your eight windes from your Antarktich Pole, to your Paralell circle: and thus must you doe euer and anone, soz the oftener you doe obserue this custome, the better and perfecter shall your course be. Now thus briesely I make an ende of the sayling by the Globe. But soz them that doe occupie y South parts, nothing is better than their cards. Because I haue declared vnto you the length of certaine of the paralels, what leagues the earth doth containe in compasse vnder them, now will I shew you how many leagues distance there is, from one paralel vnto an other, accordingly as I haue set down in the chapter next going befoze this, where I doe shew the circumference first vnder the Equinotiall, and then in the Latitude of twenty degrées, and then 30 degrées, &c. First from the Equinotiall vnto the latitude of twentie degrées is 400 leagues,

D iii.

and

The Regiment for the Sea.

and from 20 degrees vnto 30 degrees in Latitude, is 200 leagues. The like is from 30 vnto 40 degrees, and from 40 to 50, and from 50 to 60. So that there is from the Latitude of 60 degrees vnto the Equinotiall 1200 leagues, & there a degree of Longitude is but halfe so much as it is vnder the Equinotiall, and the whole circumference of the earth, but halfe so much in like manner from the latitude of 60 degrees vnto the Pole is but 600 leagues, and there all the Meridians doth méete: and it is from the Equinotiall vnto either of the two poles of the world 1800 leagues &c. Which is the fourth part of the compasse of the whole earth.

The cause
why that
you may
see y^e sailes
of a ship,
& not the
hold.

Furthermoze, soz that you may the better vnderstand, that the earth is a Globe or Circular (which any person that doth occupie the sea, seeth most apparantly) you shall perceine it thus: if you see a shippe any thing farre off, you may perfectly see the sayle of it, but not the holde, the cause whereof, is the circularnesse of the earth, and the water of the sea: soz that the water doth rise and swell betwene you and the other ship, according to the distance betwene both the shippes, because the distance to the center of the earth or water, is in euery place alike. And he that hath desire to know further hereof, M. Dee hath made mention thereof in Euclides Elements, in his Mathematicall pzeface, and also in the twelfth booke, whether you may haue recourse: yet notwithstanding I will say a little thereof, whereby you may discerne how farre it is possible to see a shippe vpon the sea: if you be on the sea in a shippe, so that there bee but halfe a league betwene you and the other shippe, the water will be five inches and a halfe higher in the middle of the way betwene both the shippes, soz that the water is of equall distance in euery place from the center of the earth, and runneth in a crooked lyne, the which crooked lyne being subtended by a right lyne, the middlemost lyne betwene the

the two Shippes that cometh from the center of the earth, shall be shorter then the other two lines comming from the center of the earth vnto the two Shippes by five ynches and a halfe, and then it must needs bee said, that the water is higher by the said five ynches and a halfe. And furthermore, if the two Shippes were a league asunder, then the water by his circularnesse should be 22. ynches higher than the leuell in the middle betwene both the Shippes.

Furthermore, if the two Shippes be two leagues asunder, then the water shall be higher then the leuell in the middle betwene both the Shippes, by 88 ynches, which is 7 fote & foure ynches. If the two Shippes be 3 leagues the one from the other, then the water shall be higher than the leuell in the midway betwene both the Shippes, by 198 ynches, which is 16 fote & a halfe.

Furthermore, if the two Shippes be foure leagues asunder, the water shall be higher than the leuell in the midway betwene both the Shippes, by 252 ynches, which is 29 fote and foure ynches. And furthermore, if the two Shippes were five leagues asunder, the water should be higher than the leuell of the midway betwene both the Shippes, by 550 ynches, which is 46 fote lacking 2 ynches. Yet furthermore, if the two Shippes were six leagues asunder, the water should be higher than the leuell in the midway betwene them by 792 ynches, which is sixtie six fote. Furthermore also, if the two Shippes were 7 leagues asunder, the water should be higher than the leuell in the midway betwene both the Shippes by 1878 ynches, and that is 90 fote, which is as farre and rather farther than it is possible to see any shippe vpon the Sea: Neither is it possible to see any land further, but such land as is verye high land, which for the greatnesse of the height may be seene, wherefore six leagues or seven leagues is called a keune.

To know how many fote and inches y the water is higher than the leuell or the Sea, betwene two Shippes.

What a ken is, the cause why you may see a ship farther out of the top than vpon the hatches.

Now

The Regiment for the Sea.

Now the circularnesse of the earth is the cause why you may see a ship or land further out of the top, than upon the hatches : wherefore it is a plaine case, that the earth and Sea is not flat, but circular, as is afore declared, &c.

The 19. Chapter, is as touching the making of Plats or Cardes for the Sea, and not to paint their Cardes as they doe, but rather to supply the vacant places with other necessarie matters : and also of three necessarie things contained in the Plats or cards, and their vses, which is the most necessarie thing in Nauigation.

Not to
paint their
Sea cards,
but to vse
the vacat
places
with other
necessarie
matter.

FOR the making of Plats or Cardes, as touching *Hydrographie*, commonly called Sea cards, I meane to say little thereof : for that it is sufficiently declared in the booke called the Art of Nauigation : sauing this, I would wish them that be makers of plattes and cards for the Sea, not to paint their compasses with so many colours : neither upon the land with so many flags, for that it doth rather hurt than good : although it may be sayd, they be so painted in vacant places, those vacant places I would wish them to furnish with these two matters, in this order.

First, in some vacant place to make a compasse, and to place against every point of the halfe of the compasse, letters, or some other figures or charecters, and in like manner, to make that letter or charecter at the haven, port, or place where the Shippe maketh a full sea, being upon that point of the compasse, upon which the saide letter or charecter doth stand : as for ensample thus : I place A at the East point. B at the East and by South. C at the East Southeast. D at Southeast & by East, and so consequently

quently to all the points vnto the West, then that being done, where it floweth an East mone, I place A in the Plat of Carde, and where an East and by south Mone, I doe place B. in the Carde, and so forth, according to the place of the Mone that maketh a full sea. And where it runneth halfe tide vnder other, to make some note vpon the Carde in that place, &c.

This also is verie necessarie to be done, to furnish vp all the vacant places of the Plat of Carde, to drawe the shape of fashion of euerie head land or high land alongst euerie Coast that is needefull to be knowen and at what point of the Compasse the land is of that fashion: at how farre off the land riseth in that fashion: and so to make the fashion of the land as often as the land altereth the forme & fashion: & last of all, at what point of the compasse the land hath that shape or fashion: for being vpon one side, the land riseth of one fashion, and on the other side, of another forme or fashion.

To draw the shape of the land in their Cardes.

Also being nere the land, it will be in one fashion, and being farre off in another fashion (as is befoze declared in the 14 Chapter) for there is nothing more needefull and necessarie for a sea-man than this: to know the land whē he seeth it, and there is no way better to make him remember it, than to haue notes how the land doth rise vpon euerie side, & what greater incontinence may there grow by any meanes, that there may be by mistaking of a place: for it were 20 times better to be thoroughly persuaded, y he knoweth it not, than to thinke he doth know it, not being y place. For whereas he doth thinke to preuent the daungers, he may willingly run vpon the daungers, not knowen of him. Therefore in my opinion they can do no better thā to furnish their vacant places in their Plats and Cardes with this matter: The vse of the sea Cardes is most necessarie for Nauigation for long voyages: first, for that it sheweth you how one place beareth from an-

Great infirmities by mistaking any place.

How necessary a thing the Sea cards be.

The Regiment for the Sea.

¶.necessa-
rie things
in the Sea
Cardes.

To know
how any
place doth
beare it
you by the
Cardes.

To know
how far it
is vnto any
place by
the cardes.

other: secondly, the distance of any place how farre the one is from the other. Of which the one is represented by the lines of the Compasse: the other by y scale or trunk of measure, if the plat be truly made. Thirdly, it sheweth you in what Latitude from the Equinoctial or altitude of the Pole any place is in, by the line of degrees.

Now to direct your course through the Sea by the card, to any place assigned, you must first looke by what point of the compasse it beareth from you, from the place you meane to set off from the land, vnto the place you would first fall with. Which you shall know thus: take a line from the next compasse, vnto the place you meane to depart from, then open your Compasses vnto one of those lines by your iudgement that falleth neare vnto your place assigned: and let the other foot of your Compasses stand iust at that place where your shippe is, when you direct your course: that done, beare your hands forwards euen, and let the one ende be still vpon the line to the which you did open your Compasses, vntill you come to your place assigned. But if it falleth short of the place assigned, then take the next line nearer vnto the place you departed from: when you haue so done, if your Compasses doe over-reach the place assigned, then take a lyne further off from the place you doe meane to sette off from: and so shall you see by what point of the compasse the place assigned doth beare from you &c. If you would know how farre the place assigned is from you, set the one foot of the compasses vpon y place you depart from, and stretch out the other foot vnto the place assigned iust, that done, (keeping your Compasses at that extent) set them to y scale or trunk of measure, & that will shew you iustly how many leagues it is from the place of your departing vnto the place assigned. If the distance betwene the two places be moze than the compasses will reach at once, then first set your compasses vnto the scale, opening the com-

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compasses vnto 100 leagues more or lesse, as your scale and compasses will giue you leaue at your discretion, after that set the one foote at the place of your departing, and the other foote of the Compasses right towarde the place assigned, as oftentimes as the distance betwene the two places doth require, and then (the compasses being opened vnto 100 leagues) you may conclude it to be so many 100 leagues vnto the place assigned, as the compasses did shew vnto you: but if there be any odde measure, then open your compasses to that quantitie, and set that to the scale, and it will shew you the iust content of that measure, more than so many 100 leagues &c. *Furthermoze, touching the third commodity which is to know what Latitude any place assigned hath: sette one foote of the compasses vpon the place assigned, and open the compasses vnto the next East and West lyne, then carrie that vnto the lyne of Degrees, keeping the foote of the compasses vnto the East and West line) it will shew iustlie the number of Degrees that the Pole is aboue the Horizon.*

To know
what latitude
or height of
the Pole an
place be
by y^e car

So of these three waies, by the first is knowen by what point of the compasse any place beareth from you. By the second is knowen how farre distance it is vnto any place assigned. And by the third is knowen in what height the Pole is, in any place assigned, &c. (Now this being known) you may with the more ease know how to attaine to come vnto the port or place assigned.

Yet furthermoze, there is to be considered in (directing the course of a shippe to any place assigned) what impediments may be by the way: as tides, currents, or the scantnesse of the winde, which may put the shippe vnto the leaues of his course, as also the surging of the Sea: and all this must be considered by the master and Pilot of the ship. Likewise also in long voyages, the winde may often shift vpon him, and sometime the winde may be such as he

Things to
be considered
by the
Master or Pilot
of a ship,

P. II.

cannot

The Regiment for the Sea.

They may
correct
the ships
way by
the taking
the height
of the
Pole.

cannot lye his course : wherefoze he must keepe a perfect account of the shippes way, and consider what point the shippe hath made her way good by. And at euerie time that the winde doth shift, and the shippe cannot lye her course, to note in the Carde or Plat in what place the ship may be : in hauing a speciall regard vnto the way of the ship, as touching the swiftnesse or slownesse that the shippe goeth : and if so be the weather be cleare either by night or day, to take the true Altitude of the Pole : soz by that they may correct the shippes way, and giue a verie neare gesse, how the place (assigned to goe vnto) doth beare from them, as also how farre it is thether, sauing onely in the East and West course : and then they haue no other help but onely the very account of the shippes way.

And to correct their dead reckening by the Altitude of the Pole, they must doe this : (especially if the shippe haue hadde often trauerse, by the meanes of contrarie winds, so that she could not lye her course,) consider vpon the Carde or Plat how long the shippe hath made her way good, soz so many points as the shippe hath sailed by : then (if by the Altitude of the Pole the shippe hath gone more than the dead reckening did shew you) repaire vnto the lyne of degrees, and set the one foote of the Compasses vpon the degree and place of the height of the Pole, and the other vpon the next East and West line: that done beare it vnto the place you suppose the shippe to be in, and then bring forwards with the other Compasses, what point of the Compasse the shippe hath sailed by, and at the meeting of the two paire of Compasses, make a note for the place that the ship is in : from which place you may with your Compasses see, how the place assigned doth beare, & also how farre off you be from the same.

Furthermoze (if you finde by the height of the Pole that you are not so farre shot, as your reckening did shew vnto you) you must pull backe so much from the poynt that

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that the Shippe hath sailed by, as the height of the Pole doth shew vnto you by the order before rehearsed, &c.

Furthermore (as I haue declared vnto you in the 14. Chapter going before) how to know how farre the land is off from you, (the distance betwene any two places being known, by setting φ land with your Compasse, euen so you may doe the like by your Card, as thus: setting the two places with your Compasse, and knowing that the two places be so many leagues asunder, then shall you re-
pare to the Card, and according to the bearing of the two places by the points of the Compasse, you (being thwart of one of these two places) shall apply it with your Compasse vnto your Scale: But for that in the Scale the leagues be so small, you may assigne twentie leagues to be but one league, and open the compasses vnto that proportion that the two places be asunder, and the one of them doth beare from the other: that done, open the Compasses againe from the Center of the Compasse, vnto the place that you do imagine to be the Land, and then

apply it vnto the trunke of measure, and you

shall see how many Leagues you bee from the shore, & so forth. So that

you may see that the Plat

or Card is one of the

necessariest things

that is to be v-

sed in Naui-

gation.

To know
how farre
that the
land is off
from you
by the
sight of the
land with
your com-
passe, to
do it vpon
the
land.



The Regiment for the Sea.

The 20. Chapter is of the Longitude and declination of
32. notable fixed starres, verie necessarie for Nauigation,
with tables of their shpping, & at what point of your
Compass they doe both rise and set: and also Ta-
bles for euerie moneth of the yeere, declaring at
what houre and minute they be South, run-
ning from the first day of the moneth, to
the fiftenth, & from the fiftenth to
the last day, and will continue
these 100. yeeres without
much error.



If the Pole
be raised
more than
5. or 60
degrees, it
is to high
to be ob-
serued by
the crosse
stafe.

These
stars will
serue be-
yond the
equinocti-
all.
To know
the rising
& setting
of the stars

And furthermore, I doe thinke it conue-
nient for diuers considerations, to shew
the Longitude and declination of certaine
of the most notablest fixed stars y are neer
vnto the Equinoctiall, to the number of
32. of them, which are verie necessarie for
Nauigation in diuers respects, as this: if you be vnto the
North parts where the North Pole is raised more than
50. or 60. degrees, then the North starre is too high to be
observed or taken with the Crosse staffe, (as I haue decla-
red in the sixt chapter) and it may chaunce so that in the
day the sunne is not to be seene at none, and then these
starres may serue your turne in the night.

And furthermore they be very good for them that haue
occasion to trauaile beyond the Equinoctiall, where the
North Pole is vnder the Horizon, in vsing their declina-
tion as they do the sunnes declination in all points, which
doth appeare in the 7. 8. and 9. chapters of this booke. And
furthermore they be verie necessarie for sea-faring men
to know the houres of the night, both by their rising vpon
the Meridian, and also by their rising and setting: you may know the true time of their rising and setting in
euerie

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euerie Latitude by their declination from the Equinoctial, whether they decline to the south partes, or North parts, as is declared by the declination of the Sunne in the 11. Chapter.

in all places by the order of the xi. cha. The order of the Table following.

And furthermore, by any of these Starres you may try the variation of your compasse by night, &c. Now shall follow the Table of all these starres. The first row of this Table containeth the names of the starres. The second, the signes whereunto the Longitude of the starres is referred. The third, the degrees of the signes. The fourth, the minutes belonging thereunto. The fifth, the degrees of declination. The sixth, the odde minutes belonging thereunto. The sequenth sheweth towarde what part they decline, by letters, of which N. signifieth Septentrionall, or North declination, S. signifieth Meridionall, or south declination: as in the Table doth appeare. The eight doth shewino, thing but the bignesse of the starres. Now followeth the Table.



A Table

A Table of fixed starres.

| The names of the starres. | Signes. | Longi. deg.mi | Declin deg.mi. | To what part the stars decl. | The mag. or hignes of the starres. |
|------------------------------------|---------|------------------|-------------------|---------------------------------|--|
| Whales backe | Aries | 6. 13 | 12. 11 | S declin. | 3 mag: |
| Whales belly | Aries | 16. 13 | 12. 1 | S declin. | 3 mag: |
| Rammes hozne | Aries | 27. 53 | 19. 7 | N declin. | 3 mag: |
| Rammes head | Taurus | 2. 13 | 21. 16 | N declin. | 3 mag: |
| Bulles eye | Gemini | 3. 53 | 15. 54 | N declin. | 1 mag: |
| Orions left foote | Gemini | 10. 23 | 9. 9 | S declin. | 1 mag: |
| Orions left shoulder | Gemini | 14. 33 | 15. 12 | S declin. | 1 mag: |
| Orions girdle the middlemost. | Gemini | 18. 33 | 1. 48 | S declin. | 2 mag: |
| Orions right shoul. | Gemini | 23. 13 | 6. 21 | N declin. | 1 mag: |
| Great Dogge | Cancer | 8. 53 | 15. 40 | S declin. | 1 mag: |
| Lesser Dogge | Cancer | 20. 23 | 5. 57 | N declin. | 1 mag: |
| Brightest in Hydra | Leo | 21. 13 | 5. 00 | S declin. | 2 mag: |
| Lions necke | Leo | 23. 23 | 21. 59 | N declin. | 2 mag: |
| Lions heart | Leo | 23. 43 | 13. 48 | N declin. | 1 mag: |
| Lions backe | Virgo | 5. 23 | 22. 30 | N declin. | 2 mag: |
| Lions taile | Virgo | 15. 53 | 16. 27 | N declin. | 1 mag: |
| Rauens head | Libra | 5. 33 | 19. 53 | S declin. | 3 mag: |
| Rauens wing | Libra | 9. 13 | 17. 8 | S declin. | 3 mag: |
| Virgins spike | Libra | 17. 53 | 8. 53 | S declin. | 1 mag: |
| Arcturus betwixt Bootes legges. | Libra | 18. 13 | 21. 54 | N declin. | 1 mag: |
| South Balance | Scorpi. | 9. 13 | 13. 44 | S declin. | 2 mag: |
| North Balance | Scorpi. | 13. 23 | 7. 47 | S declin. | 2 mag: |
| Scorpions hart | Sagit. | 3. 53 | 24. 54 | S declin. | 3 mag: |
| Hercules head | Sagit. | 8. 53 | 18. 40 | N declin. | 3 mag: |
| Serpens head | Sagit. | 15. 53 | 17. 2 | N declin. | 4 mag: |
| Eagle | Capri. | 25. 3 | 6. 34 | N declin. | 2 mag: |
| Dolphins taile | Aquar. | 8. 53 | 10. 8 | N declin. | 3 mag: |
| Goates taile | Aquar. | 17. 33 | 14. 13 | S declin. | 3 mag: |
| Aquarius legge | Pisces | 2. 53 | 15. 52 | S declin. | 3 mag: |
| Pegasus shoul. | Pisces | 17. 53 | 13. 15 | N declin. | 2 mag: |
| Pegasus legge | Pisces | 23. 23 | 25. 29 | N declin. | 2 mag: |
| Whales taile | Pisces | 26. 53 | 19. 49 | S declin. | 3 mag: |

The

The vse of this Table is this: when you haue taken the height of any of these starres vpon the Meridian, the looke what declination the starre hath from the Equinoctiall: if the starre hath North declination, then subtract or take away the starres declination from the height: if it hath South declination, then add or put vnto the height the starres declination, and that will shew vnto you the height of the Equinoctiall, and then by the height of the Equinoctiall, the height of the Pole is knowen, as the seventh Chapter doth declare.

How to vse y^e stars declinatioⁿ to know y^e height of the Pole.

And now I think it conuenient to make certaine Tables, to shew vnto you at what houre & time any of these starres be vpon the Meridian, wherby they may the better know these stars. I will also shew vnto you how long any of these starres doe shine or tarrie aboue the Horizon in the Latitude from the Equinoctiall of London, that is at 51 or 52 degrees. And also at what point of the compasse any of these starres doe ryse or set, which will serue this 100 yeeres without much error.

A Table to know the rising and setting of these Starres, by what point of the Compasse, and how many houres they be aboue our Horizon, the Pole being raised 51 or 52 degrees.

THE Whales back riseth East and by South, and vnto the Southwards: and shineth 10 houres and better.

The whales belly (in a maner) as the whales back.

The Hammes hozne riseth East North-east, and setteth West North-west: and shineth 15 houres 16 minutes.

The Hammes head ryseth East North-east, and setteth West North-west: and shineth 16 houres 4 minutes.

The Bulles eye riseth nere the East North-east, and setteth

D.

The Regiment for the Sea.

setteth néere the west Northwest, and shineth 15 houres 2 minutes.

The Orions left foote riseth néere the East & by South, and setteth néere the west and by South, and shineth 10 houres and 6 minutes.

The Orions left shoulder riseth East & to the Northwards, and setteth west & to the Northwards, & shineth 12 houres 45 minuts.

The first in Orions girdle doth rise a little to y southwards of the East, & setteth a little to the southwards of the west, and shineth 11 houres 46 minutes.

Orions right shoulder riseth East, & vnto the northwards, and setteth west and vnto the Northwards, and shineth 13 houres 12 minutes.

The great dogge riseth East southeast, & setteth west southwest, and shineth 9 houres.

The lesser Dog riseth East & vnto the Northwards, and setteth west, and vnto the Northwards, and shineth 13 houres 10 minutes.

The brightest in Hydra riseth East & vnto the Southward, and setteth west and vnto the southwards, and shineth 11 houres and 7 minutes.

The Lyons neck riseth East northeast, & to the northwards, and setteth west northwest, & to the Northwards, and shineth 16 houres 16 minutes.

The Lions hart riseth néere the East northeast, and setteth néere the west northwest, and shineth 14 houres 50 minutes.

The Lyons backe riseth néere the northeast & by east, and setteth néere the northwest and by west, and shineth 16 houres 26 minutes.

The Lyons tayle riseth néere the east northeast, and setteth néere the west northwest, and shineth 15 houres 12 minutes.

The Hauens head ryseth néere the east southeast, and set,

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setteth néere the west southwest, and shineth eight houres 12 minutes.

The Ravens wing riseth néere the east southeast, and setteth néere the west southwest, & shineth 8 houres 50 minutes.

The Virgins spike riseth East and to the southwards, and setteth west & to the southwards, & shineth 11 houres foure minutes.

Arcturus betwéen Bootes thies, riseth néere the north east and by east, & setteth néere the northwest & by west, and shineth 16 houres 20 minutes.

The south Ballance riseth néere the East southeast, & setteth néere the west southwest: and shineth 9 houres 36 minutes.

The north Ballance riseth néere the east & by south, and setteth néere the west and by South, and shineth 10 houres 38 minutes.

The Scorpions heart riseth néere the southeast and by east, and setteth néere the southwest and by west, & shineth 7 houres 5 minutes.

Hercules head riseth néere the east northeast, and setteth néere the west northwest, and shineth 14 houres 56 minutes.

The serpents head riseth néere the east northeast, and setteth néere the west northwest, and shineth 14 houres, 40 minutes.

The Eagle riseth néere the East and by North, and setteth néere the west & by North: & shineth 13 houres 24 minutes.

The Dolphins taile riseth east and by North, and setteth West and by North, and shineth fiftene houres 57 minutes.

The Goates taile riseth néere the East southeast, and setteth west southwest, & shineth 9 houres 20 minutes.

The water pourers leg, riseth néere y^e East southeast,

D.ii.

and

The Regiment for the Sea.

and setteth west Southwest, and shineth eight houres 54 minutes.

The 11.
Chapter
will shew
how long
ani of the
stars will
shine in all
places.

Pegasus shoulders riseth néere the East Northeast, & setteth néere the west Northwest and shineth 14 houres 32 minutes.

Pegasus leg riseth néere Northeast, and setteth néere Northwest, and shineth 17 houres 6 minutes.

The whales tayle riseth East southeast, and setteth west southwest, and shineth 7 houres 48 minutes.

Furthermore, if you desire to know the time of any of these starres being about the Horizon in all Latitudes, then repaire to the 11 Chapter, so you shall know it ther by their declination: euen by the same order that you know the Sunnes being about the Horizon, by the Suns Declination.



These

These stars being south from the Ianua, from the Febru, from the Febru, from the
first day of Ianuarie vnto the 15. 15. to the last. 15 vnto the 15 15 to the last.

| | | | | | | | | | | | | |
|----|----------------------|-------|----|----|-------|----|----|-------|----|----|-------|----|
| 1 | Whales backe. | 5.20 | E | 1 | 4.20 | DA | 1 | 3.20 | DA | 1 | 2.20 | DA |
| 2 | Whales bellie. | 5.54 | E | 2 | 4.54 | DA | 2 | 3.54 | DA | 2 | 2.54 | DA |
| 3 | Rammes hozne. | 6.28 | E | 3 | 5.28 | E | 3 | 4.28 | DA | 3 | 3.28 | DA |
| 4 | Rammes head. | 6.45 | E | 4 | 5.45 | E | 4 | 4.45 | DA | 4 | 3.45 | DA |
| 5 | Bulles eie. | 8.52 | E | 5 | 7.52 | E | 5 | 6.52 | E | 5 | 5.52 | DA |
| 6 | Orions left foot. | 9.23 | E | 6 | 8.23 | E | 6 | 7.23 | E | 6 | 6.23 | E |
| 7 | Orions left shoulder | 9.28 | E | 7 | 8.28 | E | 7 | 7.28 | E | 7 | 6.28 | E |
| 8 | First Orions girdle. | 9.50. | E | 8 | 8.50 | E | 8 | 7.50 | E | 8 | 6.50 | E |
| 9 | Orions right shoul. | 10.12 | E | 9 | 9.12 | E | 9 | 8.12 | E | 9 | 7.12 | E |
| 10 | Great Dogge. | 11.4 | E | 10 | 10.4 | E | 10 | 9.4 | E | 10 | 8.4 | E |
| 11 | Lesser Dogge. | 12.0 | E | 11 | 11.0 | E | 11 | 10.0 | E | 11 | 9.0 | E |
| 12 | Brightest in Hidra. | 12.4 | M | 12 | 11.4 | E | 12 | 10.4 | E | 12 | 9.4 | E |
| 13 | Lions necke. | 2.12 | M | 13 | 1.12 | M | 13 | 12.12 | M | 13 | 11.12 | E |
| 14 | Lions heart. | 2.13 | M | 14 | 1.13 | M | 14 | 12.13 | M | 14 | 11.13 | E |
| 15 | Lions backe. | 3.0 | M | 15 | 2.0 | M | 15 | 1.0 | M | 15 | 12.0 | |
| 16 | Lions taile. | 3.42 | M | 16 | 2.42 | M | 16 | 1.42 | M | 16 | 1.42 | M |
| 17 | Rauens head. | 5.2 | M | 17 | 4.2 | M | 17 | 3.2 | M | 17 | 2.2 | M |
| 18 | Rauens wing. | 5.19 | M | 18 | 4.19 | M | 18 | 3.19 | M | 18 | 2.19 | M |
| 19 | Virgins spike. | 5.51 | M | 19 | 4.51 | M | 19 | 3.51 | M | 19 | 2.51 | M |
| 20 | Twixt boots thighs. | 5.56 | M | 20 | 4.56 | M | 20 | 3.56 | M | 20 | 2.56 | M |
| 21 | South balance. | 7.16 | M | 21 | 6.16 | M | 21 | 5.16 | M | 21 | 4.56 | M |
| 22 | North Balance. | 7.33 | MD | 22 | 6.33 | M | 22 | 5.53 | M | 22 | 4.33. | M |
| 23 | Scorpions heart | 8.54 | MD | 23 | 7.54 | MD | 23 | 6.54 | M | 23 | 5.54 | M |
| 24 | Hercules head. | 9.14 | MD | 24 | 8.14 | MD | 24 | 7.14 | MD | 24 | 6.14 | M |
| 25 | Serpents head. | 9.41 | MD | 25 | 8.41 | MD | 25 | 7.41 | MD | 25 | 6.41 | M |
| 26 | The Eagle. | 12.19 | DA | 26 | 11.19 | MD | 26 | 10.19 | MD | 26 | 9.19 | MD |
| 27 | Dolphins taile. | 1.12 | DA | 27 | 12.12 | DA | 27 | 11.12 | MD | 27 | 10.12 | MD |
| 28 | Cotes taile. | 1.48 | DA | 28 | 12.48 | DA | 28 | 11.48 | MD | 28 | 10.48 | MD |
| 29 | VVater pourers leg. | 2.48 | DA | 29 | 1.48 | DA | 29 | 12.48 | DA | 29 | 11.48 | MD |
| 30 | Pegasus shoulder | 3.47 | DA | 30 | 2.47 | DA | 30 | 1.47 | DA | 30 | 12.47 | DA |
| 31 | Pegasus legge. | 4.12 | DA | 31 | 3.12 | DA | 31 | 2.12 | DA | 31 | 1.12 | DA |
| 32 | Whales taile. | 4.24 | DA | 32 | 3.24 | DA | 32 | 2.24 | DA | 32 | 1.24 | DA |

A Table of the fixed starres.

March from the first to the 15. | March frō the 15. to the last. | April from the first to the 15. | April from the 15. to the last. | May from the first to the last.

| | | | | | | | | | | | | | | |
|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|
| 1 | 1.20 | DA | 1 | 11.20 | DA | 1 | 11.20 | MD | 1 | 10.20 | MD | 1 | 9.20 | MD |
| 2 | 1.54 | DA | 2 | 12.54 | DA | 2 | 11.54 | MD | 2 | 10.54 | MD | 2 | 9.54 | MD |
| 3 | 2.28 | DA | 3 | 1.28 | DA | 3 | 12.28 | DA | 3 | 11.28 | MD | 3 | 10.28 | mD |
| 4 | 2.45 | DA | 4 | 1.45 | DA | 4 | 12.45 | DA | 4 | 11.45 | MD | 4 | 10.45 | mD |
| 5 | 4.52 | DA | 5 | 3.52 | DA | 5 | 2.52 | DA | 5 | 1.52 | DA | 5 | 12.52 | DA |
| 6 | 5.23 | DA | 6 | 4.23 | DA | 6 | 3.23 | DA | 6 | 2.23 | DA | 6 | 1.23 | DA |
| 7 | 5.28 | DA | 7 | 4.28 | DA | 7 | 3.28 | DA | 7 | 2.28 | DA | 7 | 1.28 | DA |
| 8 | 5.50 | DA | 8 | 4.50 | DA | 8 | 3.50 | DA | 8 | 2.50 | DA | 8 | 1.50 | DA |
| 9 | 6.12 | E | 9 | 5.12 | DA | 9 | 4.12 | DA | 9 | 3.12 | DA | 9 | 2.12 | DA |
| 10 | 7.4 | E | 10 | 6.4 | DA | 10 | 5.4 | DA | 10 | 4.4 | DA | 10 | 3.4 | DA |
| 11 | 8.0 | E | 11 | 7.0 | E | 11 | 6.0 | DA | 11 | 5.0 | DD | 11 | 4.0 | DA |
| 12 | 8.4 | E | 12 | 7.4 | E | 12 | 6.4 | DA | 12 | 5.4 | DA | 12 | 4.4 | DA |
| 13 | 10.12 | E | 13 | 9.12 | E | 13 | 8.12 | E | 13 | 7.12 | DA | 13 | 6.12 | DA |
| 14 | 10.13 | E | 14 | 9.13 | E | 14 | 8.13 | E | 14 | 7.13 | DA | 14 | 6.13 | DA |
| 15 | 11.0 | E | 15 | 10.0 | E | 15 | 9.0 | E | 15 | 8.0 | E | 15 | 7.0 | DA |
| 16 | 11.42 | E | 16 | 10.42 | E | 16 | 9.42 | E | 16 | 8.42 | E | 16 | 7.42 | DA |
| 17 | 1.2 | M | 17 | 12.2 | M | 17 | 11.2 | E | 17 | 10.2 | E | 17 | 9.2 | E |
| 18 | 1.19 | M | 18 | 12.19 | M | 18 | 11.19 | E | 18 | 10.19 | E | 18 | 9.19 | E |
| 19 | 1.51 | M | 19 | 12.51 | M | 19 | 11.51 | E | 19 | 10.51 | E | 19 | 9.51 | E |
| 20 | 1.56 | M | 20 | 12.56 | M | 20 | 11.56 | E | 20 | 10.56 | E | 20 | 9.56 | E |
| 21 | 3.16 | M | 21 | 2.16 | M | 21 | 1.16 | M | 21 | 12.16 | M | 21 | 11.16 | E |
| 22 | 3.33 | M | 22 | 2.23 | M | 22 | 1.33 | M | 22 | 12.33 | M | 22 | 11.33 | E |
| 23 | 4.54 | M | 23 | 3.54 | M | 23 | 2.54 | M | 23 | 1.54 | M | 23 | 12.54 | M |
| 24 | 5.14 | M | 24 | 4.14 | M | 24 | 3.14 | M | 24 | 2.14 | M | 24 | 1.14 | M |
| 25 | 5.41 | M | 25 | 4.41 | M | 25 | 3.41 | M | 25 | 1.41 | M | 25 | 3.41 | M |
| 26 | 8.19 | MD | 26 | 7.19 | MD | 26 | 6.19 | MD | 26 | 5.19 | MD | 26 | 4.19 | M |
| 27 | 9.12 | MD | 27 | 8.12 | MD | 27 | 7.12 | MD | 27 | 6.12 | MD | 27 | 5.12 | MD |
| 28 | 9.48 | MD | 28 | 8.48 | MD | 28 | 7.48 | MD | 28 | 7.48 | MD | 28 | 5.48 | MD |
| 29 | 10.48 | MD | 29 | 9.48 | MD | 29 | 8.48 | MD | 29 | 7.48 | MD | 29 | 6.48 | MD |
| 30 | 11.47 | MD | 30 | 10.47 | MD | 30 | 9.47 | MD | 30 | 8.47 | MD | 30 | 7.47 | MD |
| 31 | 12.12 | DA | 31 | 11.22 | MD | 31 | 10.12 | MD | 31 | 9.12 | MD | 31 | 8.12 | MD |
| 32 | 12.24 | DA | 32 | 11.24 | MD | 32 | 10.24 | MD | 32 | 9.24 | MD | 32 | 8.24 | MD |

May.

A Table of the fixed starres,

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May from the 15. to the last. | June from the 15. to the last. | July from the 15. to the last. | August from the 15. to the last. | September from the 15. to the last.

| | | | | | | | | | | | | | | |
|----|-------|----|----|-------|----|----|-------|----|----|-------|----|----|-------|----|
| 1 | 8.20 | MD | 1 | 7.20 | MD | 1 | 6.20 | MD | 1 | 5.20 | MD | 1 | 4.20 | M |
| 2 | 8.54 | MD | 2 | 7.54 | MD | 2 | 6.54 | MD | 2 | 5.54 | MD | 2 | 4.54 | MD |
| 3 | 9.28 | MD | 3 | 8.28 | MD | 3 | 7.28 | MD | 3 | 6.28 | MD | 3 | 5.28 | MD |
| 4 | 9.45 | MD | 4 | 8.45 | MD | 4 | 7.45 | MD | 4 | 6.45 | MD | 4 | 5.45 | MD |
| 5 | 11.52 | MD | 5 | 10.52 | MD | 5 | 9.52 | MD | 5 | 8.52 | MD | 5 | 7.52 | MD |
| 6 | 12.23 | DA | 6 | 11.23 | MD | 6 | 10.23 | MD | 6 | 9.23 | MD | 6 | 8.23 | MD |
| 7 | 12.28 | DA | 7 | 11.28 | MD | 7 | 10.28 | MD | 7 | 9.28 | MD | 7 | 8.28 | MD |
| 8 | 12.50 | DA | 8 | 11.50 | MD | 8 | 10.50 | MD | 8 | 9.50 | MD | 8 | 8.50 | MD |
| 9 | 1.12 | DA | 9 | 12.12 | DA | 9 | 11.12 | MD | 9 | 10.12 | MD | 9 | 9.12 | MD |
| 10 | 2.4 | DA | 10 | 1.4 | DA | 10 | 12.4 | DA | 10 | 11.4 | MD | 10 | 10.4 | MD |
| 11 | 3.0 | DA | 11 | 2.0 | DA | 11 | 1.0 | DA | 11 | 12.0 | | 11 | 11.0 | MD |
| 12 | 3.4 | DA | 12 | 2.4 | DA | 12 | 1.4 | DA | 12 | 12.4 | DA | 12 | 11.4 | MD |
| 13 | 5.12 | DA | 13 | 4.12 | DA | 13 | 3.12 | DA | 13 | 2.12 | DA | 13 | 1.12 | DA |
| 14 | 5.13 | DA | 14 | 4.13 | DA | 14 | 3.13 | DA | 14 | 2.13 | DA | 14 | 1.13 | DA |
| 15 | 6.0 | DA | 15 | 5.0 | DA | 15 | 4.0 | DA | 15 | 3.0 | DA | 15 | 2.0 | DA |
| 16 | 6.42 | DA | 16 | 5.42 | DA | 16 | 4.42 | DA | 16 | 3.42 | DA | 16 | 2.42 | DA |
| 17 | 8.2 | DA | 17 | 7.2 | DA | 17 | 6.2 | DA | 17 | 5.2 | DA | 17 | 4.2 | DA |
| 18 | 8.19 | DA | 18 | 7.19 | DA | 18 | 6.19 | DA | 18 | 5.19 | DA | 18 | 4.19 | DA |
| 19 | 8.51 | DA | 19 | 7.51 | DA | 19 | 6.51 | DA | 19 | 5.51 | DA | 19 | 4.51 | DA |
| 20 | 8.56 | DA | 20 | 7.56 | DA | 20 | 6.56 | DA | 20 | 5.56 | DA | 20 | 4.56 | DA |
| 21 | 10.16 | E | 21 | 9.16 | DA | 21 | 8.16 | DA | 21 | 7.16 | DA | 21 | 6.16 | DA |
| 22 | 10.33 | E | 22 | 9.33 | DA | 22 | 8.33 | DA | 22 | 7.33 | DA | 22 | 6.33 | DA |
| 23 | 11.54 | E | 23 | 10.54 | E | 23 | 9.54 | DA | 23 | 8.54 | DA | 23 | 7.54 | DA |
| 24 | 12.14 | M | 24 | 11.14 | E | 24 | 10.14 | E | 24 | 9.14 | E | 24 | 8.14 | E |
| 25 | 12.41 | M | 25 | 11.41 | E | 25 | 10.41 | E | 25 | 9.41 | E | 25 | 8.41 | E |
| 26 | 3.19 | M | 26 | 2.19 | M | 26 | 1.19 | E | 26 | 12.19 | M | 26 | 11.19 | E |
| 27 | 4.12 | MD | 27 | 3.12 | M | 27 | 2.12 | M | 27 | 1.12 | M | 27 | 12.12 | M |
| 28 | 4.48 | MD | 28 | 3.48 | M | 28 | 2.48 | M | 28 | 2.48 | M | 28 | 12.48 | M |
| 29 | 5.48 | MD | 29 | 4.48 | MD | 29 | 3.48 | M | 29 | 2.48 | M | 29 | 1.48 | M |
| 30 | 6.47 | MD | 30 | 5.47 | MD | 30 | 4.47 | MD | 30 | 3.47 | M | 30 | 2.47 | M |
| 31 | 7.12 | MD | 31 | 6.12 | MD | 31 | 5.12 | MD | 31 | 4.12 | MD | 31 | 3.12 | M |
| 32 | 7.24 | MD | 32 | 6.24 | MD | 32 | 5.24 | MD | 32 | 2.24 | MD | 32 | 3.24 | M |

August.

A Table of the fixed starres,

| August from the first to the 15. | | | August frō the 15. to the last. | | | Septēb. frō the first to the 15. | | | Sep. from the 15. to the last. | | | Octo. from the first to the last | | |
|-------------------------------------|-------|----|------------------------------------|-------|----|-------------------------------------|-------|----|-----------------------------------|-------|----|-------------------------------------|-------|----|
| 1 | 3.20 | M | 1 | 2.20 | M | 1 | 1.20 | M | 1 | 12.20 | M | 1 | 11.20 | E |
| 2 | 3.54 | M | 2 | 2.54 | M | 2 | .54 | M | 2 | 12.54 | M | 2 | 11.54 | E |
| 3 | 4.28 | M | 3 | 3.28 | M | 3 | 2.28 | M | 3 | 1.28 | M | 3 | 12.28 | M |
| 4 | 3.45 | MD | 4 | 3.45 | M | 4 | 2.45 | M | 4 | 1.45 | M | 4 | 12.45 | M |
| 5 | 6.52 | MD | 5 | 5.52 | MD | 5 | 4.52 | M | 5 | 3.52 | M | 5 | 2.52. | M |
| 6 | 7.23 | MD | 6 | 6.23 | MD | 6 | 5.23 | M | 6 | 4.23 | M | 6 | 3.23 | M |
| 7 | 7.28 | MD | 7 | 6.28 | MD | 7 | 5.28 | M | 7 | 4.28 | M | 7 | 3.28 | M |
| 8 | 7.50 | MD | 8 | 6.50 | MD | 8 | 5.50 | MD | 8 | 4.50 | M | 8 | 3.50 | M |
| 9 | 8.12 | MD | 9 | 7.12 | MD | 9 | 6.12 | MD | 9 | 5.12 | M | 9 | 4.12 | M |
| 10 | 9.4 | MD | 10 | 8.4. | MD | 10 | 7.4 | MD | 10 | 6.4 | MD | 10 | 5.4 | M |
| 11 | 10.0 | MD | 11 | 9.0 | MD | 11 | 8.0 | MD | 11 | 7.0 | MD | 11 | 6.0 | M |
| 12 | 10.4 | MD | 12 | 9.4 | MD | 12 | 8.4 | MD | 12 | 7.4 | MD | 12 | 6.4 | M |
| 13 | 12.12 | DA | 13 | 11.12 | MD | 13 | 10.12 | MD | 13 | 9.12 | MD | 13 | 8.12 | MD |
| 14 | 12.13 | DA | 14 | 11.13 | MD | 14 | 10.13 | MD | 14 | 9.13 | MD | 14 | 8.13 | MD |
| 15 | 1.0 | DA | 15 | 12.0 | | 15 | 11.0 | MD | 15 | 10.0 | MD | 15 | 9.0 | MD |
| 16 | 1.42 | DA | 16 | 12.42 | DA | 16 | 11.42 | MD | 16 | 10.42 | MD | 16 | 9.42 | MD |
| 17 | 3.2 | DA | 17 | 2.2 | DA | 17 | 1.2 | DA | 17 | 12.2. | DA | 17 | 11.2 | MD |
| 18 | 3.19 | DA | 18 | 2.19 | DA | 18 | 1.19 | DA | 18 | 12.19 | DA | 18 | 11.19 | MD |
| 19 | 3.51 | DA | 19 | 2.51 | DA | 19 | 1.51 | DA | 19 | 12.51 | DA | 19 | 11.51 | MD |
| 20 | 3.56 | DA | 20 | 2.56 | DA | 20 | 1.56 | DA | 20 | 12.56 | DA | 20 | 11.56 | MD |
| 21 | 5.16 | DA | 21 | 4.16 | DA | 21 | 3.16 | DA | 21 | 2.16 | DA | 21 | 1.16 | DA |
| 22 | 5.33 | DA | 22 | 4.33 | DA | 22 | 3.33 | DA | 22 | 2.33 | DA | 22 | 1.33 | DA |
| 23 | 6.54 | DA | 23 | 5.54 | DA | 23 | 4.54 | DA | 23 | 3.54 | DA | 23 | 2.54 | DA |
| 24 | 7.14 | DA | 24 | 6.14 | DA | 24 | 5.14 | DA | 24 | 4.14 | DA | 24 | 3.14 | DA |
| 25 | 7.41 | DA | 25 | 6.41 | DA | 25 | 5.41 | DA | 25 | 4.41 | DA | 25 | 3.41 | DA |
| 26 | 12.19 | E | 26 | 9.19 | E | 26 | 8.19 | E | 26 | 7.19 | E | 26 | 6.19 | E |
| 27 | 11.12 | E | 27 | 10.12 | E | 27 | 9.12 | E | 27 | 8.12 | E | 27 | 7.12 | E |
| 28 | 11.48 | E | 28 | 10.48 | E | 28 | 9.48 | E | 28 | 8.48 | E | 28 | 7.48 | E |
| 29 | 10.48 | M | 29 | 11.48 | E | 29 | 10.48 | E | 29 | 9.48 | E | 29 | 8.48 | E |
| 30 | 1.47 | M | 30 | 12.47 | E | 30 | 11.47 | M | 30 | 10.47 | E | 30 | 9.47 | E |
| 31 | 2.12 | M | 31 | 1.12 | M | 31 | 12.12 | M | 31 | 11.12 | E | 31 | 10.12 | E |
| 32 | 2.24 | M | 32 | 1.24 | M | 32 | 12.24 | M | 32 | 11.24 | E | 32 | 10.24 | E |

October

Octo. from the 15. to the last. | Nouemb frō the 15. first to the last. | Nouēb frō the 15. first to the last. | Deēmb frō the 15. first to the last. | Decemb. frō the 15. to the last.

| | | | | | | | | | | | | | | |
|----|--------|----|----|-------|----|----|-------|----|----|--------|----|----|-------|----|
| 1 | 10.20 | E | 1 | 9.20 | E | 1 | 8.20 | E | 1 | 7.20 | E | 1 | 6.20 | E |
| 2 | 14.54. | E | 2 | 9.54 | E | 2 | 8.54 | E | 2 | 7.54 | E | 2 | 6.54 | E |
| 3 | 11.28 | E | 3 | 10.28 | E | 3 | 9.28 | E | 3 | 8.28 | E | 3 | 7.28 | E |
| 4 | 11.45 | E | 4 | 10.45 | E | 4 | 9.45 | E | 4 | 8.45 | E | 4 | 7.45 | E |
| 5 | 1.52 | M | 5 | 12.52 | M | 5 | 11.52 | E | 5 | 10.52. | E | 5 | 9.52 | E |
| 6 | 2.23 | M | 6 | 1.23 | M | 6 | 12.23 | M | 6 | 11.23 | E | 6 | 10.23 | E |
| 7 | 2.28 | M | 7 | 1.28 | M | 7 | 12.28 | M | 7 | 11.28 | E | 7 | 10.28 | E |
| 8 | 2.50 | M | 8 | 1.50 | M | 8 | 12.50 | M | 8 | 11.50 | E | 8 | 10.50 | E |
| 9 | 3.12 | M | 9 | 2.12 | M | 9 | 1.12 | M | 9 | 12.12 | M | 9 | 11.12 | E |
| 10 | 4.4. | M | 10 | 3.4 | M | 10 | 2.4 | M | 10 | 1.4 | M | 10 | 12.4 | M |
| 11 | 5.0 | M | 11 | 4.0 | M | 11 | 3.0 | M | 11 | 2.0 | M | 11 | 1.0 | M |
| 12 | 5.4 | M | 12 | 4.4 | M | 12 | 3.4 | M | 12 | 2.4 | M | 12 | 1.4 | M |
| 13 | 7.12 | MD | 13 | 6.12 | M | 13 | 5.12 | M | 13 | 4.12 | M | 13 | 2.12 | M |
| 14 | 7.13 | MD | 14 | 6.13 | M | 14 | 5.13 | M | 14 | 4.13 | M | 14 | 2.13 | M |
| 15 | 8.0 | MD | 15 | 7.0 | M | 15 | 6.0 | M | 15 | 4.0 | M | 15 | 4.0 | M |
| 16 | 8.42 | DM | 16 | 7.42 | MD | 16 | 6.42 | M | 16 | 5.42 | M | 16 | 4.42 | M |
| 17 | 10.2 | MD | 17 | 9.2 | DM | 17 | 8.2. | MD | 17 | 7.2 | M | 17 | 6.2 | M |
| 18 | 10.19 | MD | 18 | 9.19 | MD | 18 | 8.19 | MD | 18 | 7.19 | M | 18 | 6.19 | M |
| 19 | 10.51 | MD | 19 | 9.51 | MD | 19 | 8.51 | MD | 19 | 7.51 | MD | 19 | 6.51 | M |
| 20 | 10.56 | MD | 20 | 9.56 | MD | 20 | 8.56 | MD | 20 | 7.56 | MD | 20 | 6.56 | M |
| 21 | 12.16 | DA | 21 | 11.16 | MD | 21 | 10.16 | MD | 21 | 9.16 | MD | 21 | 8.16 | MD |
| 22 | 12.33 | DA | 22 | 11.33 | MD | 22 | 10.33 | MD | 22 | 9.33 | MD | 22 | 8.33 | MD |
| 23 | 1.54 | DA | 23 | 12.54 | DA | 23 | 11.54 | MD | 23 | 10.54 | MD | 23 | 9.54 | AD |
| 24 | 2.14 | DA | 24 | 1.14 | DA | 24 | 12.14 | DA | 24 | 11.14 | MD | 24 | 10.14 | MD |
| 25 | 2.41 | DA | 25 | 1.41 | DA | 25 | 12.41 | DA | 25 | 11.41 | MD | 25 | 10.41 | MD |
| 26 | 5.19 | DA | 26 | 4.19 | DA | 26 | 3.19 | DA | 26 | 2.19 | DA | 26 | 1.19 | DA |
| 27 | 6.12. | E | 27 | 5.12 | E | 27 | 4.12 | E | 27 | 3.12 | DA | 27 | 2.12 | DA |
| 28 | 6.48 | E | 28 | 5.48 | E | 28 | 4.48 | E | 28 | 3.48 | DA | 28 | 2.48 | DA |
| 29 | 7.48 | E | 29 | 6.48 | E | 29 | 5.48 | E | 29 | 4.48 | E | 29 | 3.48 | DA |
| 30 | 8.47 | E | 30 | 7.47 | E | 30 | 6.47 | E | 30 | 5.47 | E | 30 | 4.47 | E |
| 31 | 9.12 | E | 31 | 8.12 | E | 31 | 7.12 | E | 31 | 6.12 | E | 31 | 5.12 | F |
| 32 | 9.24 | E | 32 | 8.24 | E | 32 | 7.24 | E | 32 | 6.24 | E | 32 | 5.24 | E |

R

Now

A Table of the fixed starres,

| August from the first to the 15. | | | August frō the 15. to the last. | | | Septēb. frō the first to the 15. | | | Sep. from the 15. to the last. | | | Octo. from the first to the last | | |
|-------------------------------------|-------|----|------------------------------------|-------|----|-------------------------------------|-------|----|-----------------------------------|-------|----|-------------------------------------|-------|----|
| 1 | 3.20 | M | 1 | 2.20 | M | 1 | 1.20 | M | 1 | 12.20 | M | 1 | 11.20 | E |
| 2 | 3.54 | M | 2 | 2.54 | M | 2 | .54 | M | 2 | 12.54 | M | 2 | 11.54 | E |
| 3 | 4.28 | M | 3 | 3.28 | M | 3 | 2.28 | M | 3 | 1.28 | M | 3 | 12.28 | M |
| 4 | 3.45 | MD | 4 | 3.45 | M | 4 | 2.45 | M | 4 | 1.45 | M | 4 | 12.45 | M |
| 5 | 6.52 | MD | 5 | 5.52 | MD | 5 | 4.52 | M | 5 | 3.52 | M | 5 | 2.52. | M |
| 6 | 7.23 | MD | 6 | 6.23 | MD | 6 | 5.23 | M | 6 | 4.23 | M | 6 | 3.23 | M |
| 7 | 7.28 | MD | 7 | 6.28 | MD | 7 | 5.28 | M | 7 | 4.28 | M | 7 | 3.28 | M |
| 8 | 7.50 | MD | 8 | 6.50 | MD | 8 | 5.50 | MD | 8 | 4.50 | M | 8 | 3.50 | M |
| 9 | 8.12 | MD | 9 | 7.12 | MD | 9 | 6.12 | MD | 9 | 5.12 | M | 9 | 4.12 | M |
| 10 | 9.4 | MD | 10 | 8.4 | MD | 10 | 7.4 | MD | 10 | 6.4 | MD | 10 | 5.4 | M |
| 11 | 10.0 | MD | 11 | 9.0 | MD | 11 | 8.0 | MD | 11 | 7.0 | MD | 11 | 6.0 | M |
| 12 | 10.4 | MD | 12 | 9.4 | MD | 12 | 8.4 | MD | 12 | 7.4 | MD | 12 | 6.4 | M |
| 13 | 12.12 | DA | 13 | 11.12 | MD | 13 | 10.12 | MD | 13 | 9.12 | MD | 13 | 8.12 | MD |
| 14 | 12.13 | DA | 14 | 11.13 | MD | 14 | 10.13 | MD | 14 | 9.13 | MD | 14 | 8.13 | MD |
| 15 | 1.0 | DA | 15 | 12.0 | | 15 | 11.0 | MD | 15 | 10.0 | MD | 15 | 9.0 | MD |
| 16 | 1.42 | DA | 16 | 12.42 | DA | 16 | 11.42 | MD | 16 | 10.42 | MD | 16 | 9.42 | MD |
| 17 | 3.2 | DA | 17 | 2.2 | DA | 17 | 1.2 | DA | 17 | 12.2. | DA | 17 | 11.2 | MD |
| 18 | 3.19 | DA | 18 | 2.19 | DA | 18 | 1.19 | DA | 18 | 12.19 | DA | 18 | 11.19 | MD |
| 19 | 3.51 | DA | 19 | 2.51 | DA | 19 | 1.51 | DA | 19 | 12.51 | DA | 19 | 11.51 | MD |
| 20 | 3.56 | DA | 20 | 2.56 | DA | 20 | 1.56 | DA | 20 | 12.56 | DA | 20 | 11.56 | MD |
| 21 | 5.16 | DA | 21 | 4.16 | DA | 21 | 3.16 | DA | 21 | 2.16 | DA | 21 | 1.16 | DA |
| 22 | 5.33 | DA | 22 | 4.33 | DA | 22 | 3.33 | DA | 22 | 2.33 | DA | 22 | 1.33 | DA |
| 23 | 6.54 | DA | 23 | 5.54 | DA | 23 | 4.54 | DA | 23 | 3.54 | DA | 23 | 2.54 | DA |
| 24 | 7.14 | DA | 24 | 6.14 | DA | 24 | 5.14 | DA | 24 | 4.14 | DA | 24 | 3.14 | DA |
| 25 | 7.41 | DA | 25 | 6.41 | DA | 25 | 5.41 | DA | 25 | 4.41 | DA | 25 | 3.41 | DA |
| 26 | 12.19 | E | 26 | 9.19 | E | 26 | 8.19 | E | 26 | 7.19 | E | 26 | 6.19 | E |
| 27 | 11.12 | E | 27 | 10.12 | E | 27 | 9.12 | E | 27 | 8.12 | E | 27 | 7.12 | E |
| 28 | 11.48 | E | 28 | 10.48 | E | 28 | 9.48 | E | 28 | 8.48 | E | 28 | 7.48 | E |
| 29 | 10.48 | M | 29 | 11.48 | E | 29 | 10.48 | E | 29 | 9.48 | E | 29 | 8.48 | E |
| 30 | 1.47 | M | 30 | 12.47 | E | 30 | 11.47 | M | 30 | 10.47 | E | 30 | 9.47 | E |
| 31 | 2.12 | M | 31 | 1.12 | M | 31 | 12.12 | M | 31 | 11.12 | E | 31 | 10.12 | E |
| 32 | 2.24 | M | 32 | 1.24 | M | 32 | 12.24 | M | 32 | 11.24 | E | 32 | 10.24 | E |

October

A Table of the fixed starres.

65

Octo. from the 15. to the last. | Nonemb frō the 15. first to the 15. | Nouēb frō the 15. to the last. | Deēmb frō the 15. first to the 15. | Decemb. frō the 15. to the last.

| | | | | | | | | | | |
|----|--------|------|-------|------|-------|------|--------|------|-------|----|
| 1 | 10.20 | E1 | 9.20 | E1 | 8.20 | E1 | 7.20 | E1 | 6.20 | E |
| 2 | 14.54. | E2 | 9.54 | E2 | 8.54 | E2 | 7.54 | E2 | 6.54 | E |
| 3 | 11.28 | E3 | 10.28 | E3 | 9.28 | E3 | 8.28 | E3 | 7.28 | E |
| 4 | 11.45 | E4 | 10.45 | E4 | 9.45 | E4 | 8.45 | E4 | 7.45 | E |
| 5 | 1.52 | M5 | 12.52 | M5 | 11.52 | E5 | 10.52. | E5 | 9.52 | E |
| 6 | 2.23 | M6 | 1.23 | M6 | 12.23 | M6 | 11.23 | E6 | 10.23 | E |
| 7 | 2.28 | M7 | 1.28 | M7 | 12.28 | M7 | 11.28 | E7 | 10.28 | E |
| 8 | 2.50 | M8 | 1.50 | M8 | 12.50 | M8 | 11.50 | E8 | 10.50 | E |
| 9 | 3.12 | M9 | 2.12 | M9 | 1.12 | M9 | 12.12 | M9 | 11.12 | E |
| 10 | 4.4. | M10 | 3.4 | M10 | 2.4 | M10 | 1.4 | M10 | 12.4 | M |
| 11 | 5.0 | M11 | 4.0 | M11 | 3.0 | M11 | 2.0 | M11 | 1.0 | M |
| 12 | 5.4 | M12 | 4.4 | M12 | 3.4 | M12 | 2.4 | M12 | 1.4 | M |
| 13 | 7.12 | MD13 | 6.12 | M13 | 5.12 | M13 | 4.12 | M13 | 2.12 | M |
| 14 | 7.13 | MD14 | 6.13 | M14 | 5.13 | M14 | 4.13 | M14 | 2.13 | M |
| 15 | 8.0 | MD15 | 7.0 | M15 | 6.0 | M15 | 4.0 | M15 | 4.0 | M |
| 16 | 8.42 | DM16 | 7.42 | MD16 | 6.42 | M16 | 5.42 | M16 | 4.42 | M |
| 17 | 10.2 | MD17 | 9.2 | DM17 | 8.2 | MD17 | 7.2 | M17 | 6.2 | M |
| 18 | 10.19 | MD18 | 9.19 | MD18 | 8.19 | MD18 | 7.19 | M18 | 6.19 | M |
| 19 | 10.51 | MD19 | 9.51 | MD19 | 8.51 | MD19 | 7.51 | MD19 | 6.51 | M |
| 20 | 10.56 | MD20 | 9.56 | MD20 | 8.56 | MD20 | 7.56 | MD20 | 6.56 | M |
| 21 | 12.16 | DA21 | 11.16 | MD21 | 10.16 | MD21 | 9.16 | MD21 | 8.16 | MD |
| 22 | 12.33 | DA22 | 11.33 | MD22 | 10.33 | MD22 | 9.33 | MD22 | 8.33 | MD |
| 23 | 1.54 | DA23 | 12.54 | DA23 | 11.54 | MD23 | 10.54 | MD23 | 9.54 | AD |
| 24 | 2.14 | DA24 | 1.14 | DA24 | 12.14 | DA24 | 11.14 | MD24 | 10.14 | MD |
| 25 | 2.41 | DA25 | 1.41 | DA25 | 12.41 | DA25 | 11.41 | MD25 | 10.41 | MD |
| 26 | 5.19 | DA26 | 4.19 | DA26 | 3.19 | DA26 | 2.19 | DA26 | 1.19 | DA |
| 27 | 6.12. | E27 | 5.12 | E27 | 4.12 | E27 | 3.12 | DA27 | 2.12 | DA |
| 28 | 6.48 | E28 | 5.48 | E28 | 4.48 | E28 | 3.48 | DA28 | 2.48 | DA |
| 29 | 7.48 | E29 | 6.48 | E29 | 5.48 | E29 | 4.48 | E29 | 3.48 | DA |
| 30 | 8.47 | E30 | 7.47 | E30 | 6.47 | E30 | 5.47 | E30 | 4.47 | E |
| 31 | 9.12 | E31 | 8.12 | E31 | 7.12 | E31 | 6.12 | E31 | 5.12 | F |
| 32 | 9.24 | E32 | 8.24 | E32 | 7.24 | E32 | 6.24 | E32 | 5.24 | F |

R

Now

The Regiment for the Sea.

The fig-
nification
of the let-
ters in the
Table.

Now this Table serueth for every moneth in the yeere (being exactly calculated) the time of their being South, or touching your Meridian, (or as some terme it) Downestead, serving very well the Seamen to take the height of them with their instruments vpon the Sea, referring it vnto the Table of Declination that goeth befoze : The first is the houres, the second the minutes, the third be the letters that shew you whether they be South by day or by night, in the euening or morning in the forenone or afternone, of which the letter E both signifie Euening, the letter M signifieth morning, the letters DM signifieth day in the morning, and the letters DA signifieth day in the afternone (as I saide befoze) the very houre and minute of their being South. Now you see that I haue put to their being South in the day, as well as in the night, to the intent to know the houre of y^e night, as well by their setting, as also by your compasse, which I shewed you in the first Chapter or rule, namely to bring your 32 points, into 24 houres : And in like manner, in the fourth chapter by shining of the Moone to diuide the shining into equall parts, then those parts being equally diuided with the houre and minutes, the time of their shining befoze their being South, sheweth the iust rising of the starres : & the other time of their shining after their being South sheweth their setting (as I declared in the rule of the shining of the Moone.) Now (seeing the Table runneth from the first day of every moneth to the 15. from the 15 to the last daye,) if you will know the exact time betwene the first day or the 15 day, and betwixt the 15 day, and the last, doe this, looke how many daies of the moneth is past, either from the first day or 15 day, and pull so manie times foure minutes from that number as there are daies past, either from the first or 15 daie, the remainder wil shew you y^e true time of their being South. That knowen, you shall doe (as is afoze said) for their rising

ing and setting.

¶ The 21 Chapter shaweth you the making of a generall instrument, to know the houre of the day by, throughout all the world.

NOW for the making of your Instruments for the Sea, with their uses, you shall repaire to the booke of Navigation, made by Martin Curtese a Spaniard, imprinted by W. Iugge, late Printer to the Quēens Maiestie: Else I would haue shewed you the making of diuers instruments, as also the making of the Equinoctiall Diall with his vse, which is very profitable to know the houre of the day by, in all Latitudes through the whole world, for your Compasse is not to know the houre of the day by the summer, neither in the Morning nor Euening, neither can you know when the Moone is East or West, she hauing North declination, as being in the signe of Taurus, Gemini, Cancer, or Leo, because your compasse standeth flat as doth your Horizon, wherefore it is very good for sea men to vse the Equinoctiall Dialls, for that it sheweth them the true houre of the day in all Latitudes, and also the Moone doth giue a true shadow in that Diall in all Latitudes, for I doe know that Seamen are very many times deceiued wher it doth flow an East and west Moone, or any Point betwēne the Southeast & Northeast. Because in setting the Moone with their compasse (being in the North signes,) she seemeth to be East by the compasse, when she is nere the East Southeast in hir course: and in like manner when the Moone seemeth west by the compasse, she shall be a little more than west Southwest in hir course: which is a very perillous matter vnto them that should put into a tide, harborow, The Sunne & Moone do giue a full shadow by y^e compasse. The Equinoctiall diall giueth a true shadow al the world ouer.

R.ii. or ha

The Regiment for the Sea.

matter.

The moon
may declin
28 degrees
& a halfe
from the
equinocti-
all.

Of men
that will
haue in-
struments

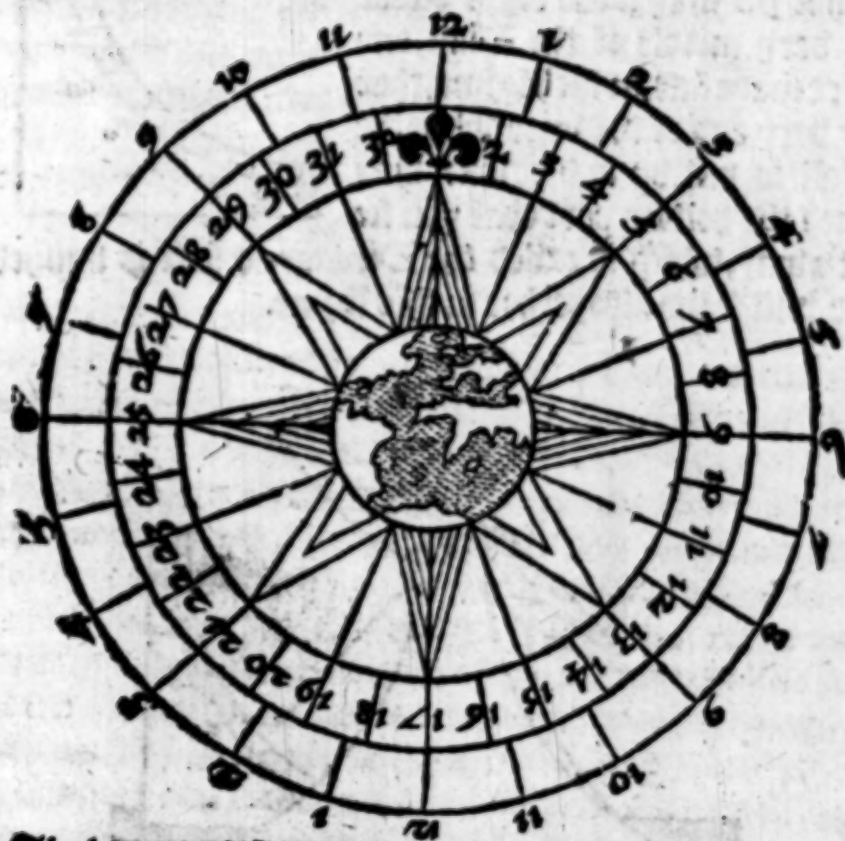
or haue, wher he knoweth ther is water enough for him, if that he doth come at a full sea, and then by the error of the Shones shadow of the compasse he is deceiued: and when he findeth the error, he thinketh y^e the cause thereof cometh by the occasion of some storme of wind y^e is like to solow, imputing it therto, that the tide doth not keepe his course, wheras y^e very cause groweth by no other meanes then by recening a false shadow by y^e Horizontal compasse: which falleth out especially if the Shone be nere hir greatest declination vnto the North parts, y^e is in the signe of Gemini and Cancer. And also y^e effect is most preferred, if the Dragons head be in the beginning of the signe of Aries: for y^e then if the Shone be in the beginning of Cancer, she shall haue 5 degrees more in declination from the equinoctial, then the sun shall haue at his greatest declination vnto the North parts. So that resoruing the moones paralax, (which is according vnto y^e latitude of any place) the Shone shall be declined 28 degrees and a halfe vnto the North part of the equinoctial: so that for auoiding of these infirmities, I would wissh them to vse the equinoctiall di- als. And furthermore, I doe think that the equinoctial di- als be not vsed amongst our mariners here in England, for that the charges is so much in the making of them, & yet it serueth no other turne but to know y^e houre of the day, & to shew the true shadow of the Shone. I haue not knowen them vsed by any English master or pilot, but on- ly by one man, which person had not it for the proper vse therof, but rather had it to say, that he had such an instru- ment as no english man had the like, and to brag y^e he had such an instrument, that he could do great feats therewith in going of long voiajes &c. I would haue no man offen- ded with me. I know the nature & qualitie of some that take charge, they will haue instruments and other things therunto appertaining, & yet they themselues do not know the vse of them, yet they wil seeme to be cunning, & y^e they
needs

The Regiment for the Sea. 67

neede no instructions of any man, for that they know all things, and yet in respect know nothing. (But notwithstanding) I would wish the that be seafaring men, to use themselves to the Equinoctiall dialls, for y they do serue a notable turnes, as well at home in these our chanel, as also in long voyages, they may make the with a very easie charge: for whereas in y Art of Navigation it is shewed how to make the in brasse, they may make the with wood in this maner, take a peece of boards end of 6 inches broad more or lesse at your discretio, & halfe an inch in thickness, then hauing cut it round & plained it smooth, you may either grane in it y 32 points of y compasse, or else paint them vpon it, with some colours, with y 24 houres, vpon both the sides as this figure sheweth.

and know
not the vse
of them.

An easie
way to
make an
Equinocti-
all Diall
with little
charge.

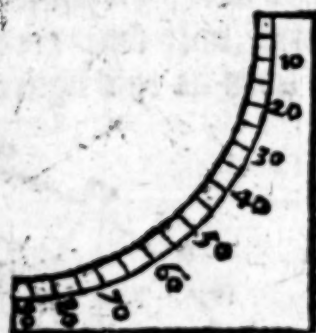


That done, take a twier of iust the Diameter of the Instrument, then put it through the middle or Center of
R.iii. the

The Regiment for the Sea.

the Instrument, then make it fast, that the one ende be halfe way through on the one side, and the other halfe on the other side: this done, make a frame with thre peeces of boards ends, to hang the Diall or instrument vpon, with one pin on the East point, & an other on the west point: then take an other peece of boards ende being square, and with a paire of compasses strike a quarter of a circle, of iust the bignesse of the quarter of the Diall, and cut all that away, and then the rest of the square that is left (at the edge of the quarter of the circle) deuide into 90 equall parts, marking it thus, 10.20.30.40.50.60.70.80.90.

As in this foyme: last of all, let this be placed in the middle of the frame, so that 90 may stand right vnder the very middle of the Diall, and there made fast, in such foyme, that the very end of the wier when the Diall is put vp and downe may touch the hollow part that you see cut away, which is called the Director, & so it is finished, and will stand altogether in this foyme.



The Equi-
noctiall
Diall.



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The vse of this Diall is most necessarie in a shippe, for that you haue occasions to transport your selues into all the climates. And to know the true houre of the day, doe this: Set this Diall by your compasse, (the directer vnto the Southwards) and then (you knowing how high the Pole is aboue the Horizon) set the ende of the wyze right against that degree, in the directer, & the other end of the wire will point iust vnto the Pole, then looke what shadow the wyze doth giue by the sunne, that is the true houre of the day. In like manner you may know the true houre of the night by the Moones shadow, & also the Moone will giue a true shadow of hir place, &c.

The 22 chapter treateth of the soundings, comming from any place out of the Occident Sea, to seeke Vshant or the Lizard, and so all alongst, till you come to the coast of Flanders: with other necessarie matters to be known to them that be Channellers, that doth occupy or deale amongst sands, banks, or such other like,

Because it is necessarie to be had in memory, for that it is a dangerous place to hit or fall with, to enter into the streue, comming home wards out of Spaine or Portugal, or from Barbarie, or any other place from the Southwards, a ship that commeth from any such place to seeke the Ile of Vshant, or the Lizard, in this route of sounding of a 100 or nintie fadams shall finde big soundings, and shall be nere about to the seames. In the route of eightie fadames you shall finde cockle shells & dents in the fallow of the lead: and in this sounding hold on your course to the North, till you change sounding, then if you be at 60 or 64 fadame, you shall finde small sand and Bathey ground, and shall be nere the coast.

The sounding nere vnto Vshant & the Lizard.

The Regiment for the Sea.

coast of Vshant. If you haue time and day, goe seeke it in the Northeast, & you shall be about 10 leagues from the Isle. If you come making your course about Wale freed, you shall finde course sand, redde & browne, and you shall haue sounding at 40 sadame: if you be towards the bank of Silley, you shall haue soundings, at 86 or 90 sadame, & you shall finde in the tallow stonie ground, and shall be well shot towards the bank of Silley. When you be at eightie sadame, you shall finde small black sand, and shall be well towards the Lizard. When you be at sixtie or 64 sadame, you shall finde white sand, & white soft worms, and shall be very nigh to the Lizard. Betwene the Cape of Coznewall and Vshant amide the channell you shall finde seuentie sadame and neere inough. Betwene Dodmon and the Foze, in the channell, you shall haue fortie or fiftie sadame. If you be thwart of Blummoth or the Start, you shall finde streamie ground and dents in the tallow & soundings 41 or 42 sadames. At the comming from Portland you shall haue thirtie fine sadames, and small shingles. And when you be nigh to Portland thirtie sadames, and stones like beanes, and this sounding wil last till S. Aldam, and in the saide sounding you shall finde white stones lyke broken Aules, and other that be bigger, and then you shall be thwart of S. Aldam or of the Ile of Wight.

The sounding in the channel.

Two or 3 leagues from the Ile of Wight, you shall finde 25 sadam, with dents and clefts in the tallow like small threds, two or three leagues from the Caskets, you shall finde 40 sadame, & big stones ragged & black. Betwene the Ile of Wight & the Bag, the deepest is but 35 or 40 sadame. Betwene the Ile of Wight & Lantargat, the deepest is but 25 or 30 sadame. Betwene Beachy & the Ile of Wight a league from the land, you shall finde 38 sadame, & Poppel as bigge as Beanes, Betwene Fairely & the water of Summe in the deepest, but 25 sadam. Betwene

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Betweene Ffolstone and Boleaene, is a banke that is called Kippe rappe : and lyeth in the midway betwæne Picardie and England, and hard a bowd by it, is twentie sixe or twentie seauen sadame. In the straight of Calyce is thirtie sadame, in the Rode of Calice is 16 sadame. And alongst the coast of Flaunders is but twentie sadame, the deepest. Thus much haue I said for the enterance of the Slaue, to come to the Riuer of Thames, and in the enterance in the midway betwæne Althant and Lizard the Pole Arcticke is eleuated 50 degrees and a halfe, and the Equinotiall is lifted above the Horizon 39 degrees and a halfe. And furthermore, for them that are Chancellers and occupiers amongst sandes and bankes, and such other lyke, they must haue consideration of these things following. As this : (first if you know how the Channell doth lie right betwæne any two sandes : you must view the land to take some markes of it, to be a leading marke. And that you shall do thus: looke some thing that standeth farre into the land, that you may know it well, being right open with the Channel of the sandes, then take an other marke nere vnto the Waters side, & the one to be right against the other, when that you be in the middle of the Channell : And then you knowing these two marks well they will be leading markes vnto you for euer to keepe that Channell.

The height
of the pole
at the en-
terance of
the Slaue.

Necessarie
things to
be noted
for them
that are
Channel-
lers and de-
lers amon-
gest sandes.

And then furthermore, if it doth so happen that the channell doth turne to keepe another course or else (some other daunger lying in the way) you must haue a thwart marke, to know both when that you are clære of any daunger, and also when that you are open of an other Channell, and that you shall doe as before is declared, to take some marke within the land, and also another nere vnto the sea, water, or riuers side to be your thwart marke when you bring them both together. And this is most specially to be noted : that these markes be verie

S.

rare,

The Regiment for the Sea.

pare, and good when the one is farre distant from the other: and those marks very slow and asketh some distance in sayling to open and shut them which are nere together vpon the land. And furthermore, for them that are Channellers or occupiers amongst sandes, for that the weather is not alwaies clere, when they haue occasion to passe through such places, it is good for them to sound the channels perfectly, and to knowe by the depth, what side of the channell they are vpon, and also how far they are shot into that channell. And also in lyke manner, to know by the sounding of any of the sides of the channell, whether they be nere any of the sands or daungers, or any breach off: for that some sandes or daungers there be hauing faire or good soundings or shaldings, that they may borrow off and on at their pleasure. There bee againe some sandes or daungers, that there is no borrowing nor sounding of them, and those be neall or deepe harde vnto the sands or daungers: for that the water is deepe hard vnto the sand: and these are verie dangerous sandes for any shippe to come nere, for that they shall haue the water verie deepe, and by and by be a ground. Yet furthermore, it is verie good for them that be channellers and occupiers amongst sandes, to know which way the tide doth set at euerie time of the tide: for that many times it happeneth so, that when the sands be vnder the water, the tide doth set crosse the channell, which is a dangerous matter if it be not verie wel considered by the Master or Pilot, &c.

The twentie three Chapter is as touching the variation of the compasse, called the Northeasting & the Northwesting of the Compasse: and how to giue a gesse to knowe the Longitude.

As



As touching the variation of the Compasse called the Northeast or Northwest, it is supposed that the Compasse doth vary by proportion, in the sailing to the Eastwards or Westwardes: if it varieth by proportion, that the North point is varied one point from the North, at 22. degrees and a halfe, and so untill the North point doth stand Northeast or Northwest. And that is, when you are 90 degrees from the Meridian that the compasse was made at, to y^e Eastwards or Westwards. Some also are of an other opinion, that the Compasse doth varie by no proportion, but doth varie according vnto the nature of some kinde of Mineralls, that is in some countrie, or some kinde of Ilands, that drawe the Compasse by the mines of the Loadstone, or Magnes Stone, that they touch their compasse with when they make them. And furthermore, the Booke of Martin Curtise) called the Arte of Nauigation saith that the compasse doth varie by proportion in this manner: which is by the proportion of a Circle, for that the North point doth alwaies point vnto a place in the heauens that is immouable, and therefore as you doe transport your selfe to the Eastward or Westward, the North point, doth still point vnto that place in the heauen: wherefore (as he saith) when you be 90 degrees in Longitude from the place y^e the compasse doth stand due south and North, that is, when you be one quarter of the circumference of the earth, in that Paralell the Compasse will be varied 4 points from the North: and as you doe transport your selfe further then the North point of the Compasse will come nearer & nearer vnto the North: and when you are iust halfe the circumference of the earth, that then the North point will stand due North vpon the Pole againe, so, that you are come to the same

Of the cō-
pas to vary
to euen
proportiō.

Of the cō-
pas to vary
by no pro-
portion.

Of the cō-
pas to va-
ry accor-
ding vnto
y^e proporti-
on of a
circle that
is swiftly,
& slowly.

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Meridian againe vpon the opposit part of the earth (as it doth appeare in the 3 part and 5 cha. of the saide booke of Martin Curtise) but if that be trure, then the Compasse doth varie swiftly at the first, and slowly afterwards, in order like vnto the sunnes declination: by which they may verie well know by what order the compasse doth varie, and so by the variation you may giue a neere estimation of the longitude, and know in how many degrees the compasse is varied one point, two points, three points, or 4 points, which is the greatest variation. Now to know the proportion, doe this: First make a circle with a paire of compasses, and strike a line by the center to the circumference, which shall be your Meridian line, then strike an other lyne by the center a crosse, that you may deuide the circle into foure equall parts, and then for the 45. degrees is the greatest variation, set 45. vnto the East part and West part, deuiding euerie one of the quarters of the circle into 45 equall parts, according to the greatest variation: then make an other circle of that Diameter, that the circumference touch that center of the circle, and deuide it as you deuided the compasse, after the rate of 32. points, although you neede not to deuide but that side to the Forwards, & then the Northeast and Southwest point will fall vpon 45 degrees: that done, draw lines according to the points of the compasse vnto the Eastwardes or Westwardes, and looke how they fall vpon the line that commeth from the center of the other circle: of which euerie quarter is deuided into 45 equall parts, and then (at the verie place that the line doth touch) draw Parallel lines in the Circle by proportion at the verie place to the Eastwardes or Westwardes, that the line of the compasse falleth vpon: & that will shew you iustly how many degrees you shall transport your selfe vnto the Eastwardes or Westwardes for the varying of the first point, seconde point, and third point: and in like manner the greatest varia-

To know
in how ma-
ny degrees
going vn-
to the east
ward or
West-
ward that
the com-
passe doth
vary one
point two
Points or 3
points, &c.

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variation which is the fourth point. So that (according to that order) it will fall out in this manner, that the Compasse will be varied one point at nere a eleuen and $\frac{1}{2}$; It will be varied two points nere about 24 degrees and a halfe.

It will be varied three points at fortie two Degrés and about a halfe. But it will not be varied the fourth point untill you be foure scoze and tenne degrés from the Meridian that the Compasse was made at: which is a verie slow varying being fortie 7 degrés and $\frac{1}{2}$ before the Compasse doth varie one point, and betwene the third point and the second point, being 18 Degrés for the varying of that point, and then from the seconde point vnto the first point is 13 Degrés and better, and last of all from the varying of one point to the Meridian it is eleuen degrés and $\frac{1}{2}$ parte, euerie degré being according to that Paralell you are in, which doth alter according vnto your latitude from the Equinoctiall, for vnder the Equinoctiall it is sixtie English miles or twentie English leagues vnto one degré. In the latitude of sixtie degrés from the Equinoctiall, there in that Paralell it is but thirtie miles, or tenne English leagues vnto one Degré, &c. As it is plainly shewed in the 16. Chapter of this booke, wherein is an instrument shewing you how many miles of Longitude will amount vnto a degré in euerie severall Latitude by the applying of a thread at your discretion: So that I conclude, If the Compasse doth varie, by that order of proportion that Martin Cur-tise doth attribute vnto it, you may giue an nere gesse to finde the Longitude by the varying of the Compasse being nere vnto the Meridian that the Compasse doth stand due South and North: But if you bee verie farre from the Meridian that the compasse was made for, then the variation is so slow, that you can haue no iudgement at all (by the variation of the compasse) to finde any

To know how many degrees is in the varying of one point.

If you will know how many leagues a degree is repaire to the 16. chapter.

The Regiment for the Sea.

Longitude.

There may grow some error in y^e proportion of the varying of the compasse.

And furthermore, if the compasse doth varie by that proportion that Martin Curtise doth affirme, I am of that opinion, that there may grow some error in proportion in those compasses that are made for any Meridian: for those compasses that are made here with us in England, whereof the needle doth stand foure or five degrees unto the Eastwardes of the North, (as doth appeare by all the needles made for Dialls, and also in the compasses) if they would haue the North point to stand due North, then the ende of the wyers vnder the card of the compasse should stand foure or five degrees unto the eastwardes of the flouredeluce: wherefore it may be doubted, that the compasse may varie more the one way than it will the other way, by that proportion that the ende of the wyer doth stand from the North point. For (if in the greatest variation) the ende of the wyer (vnder the card of the compasse) doth stand Northwest, the flouredeluce of the compasse should stand nere halfe a point to y^e westwardes of the Northwest.

And in like manner at the greatest variation, if the ende of the wyer doth stand northeast, then the flouredeluce should stand nere halfe a point unto the Northwardes of the northeast, &c. Wherefore the compasses that are deuised by Norman and are to bee had at the house of T. Hood dwelling a little beneath the Minories without Algate betwene the signe of the redde Lion and the Elme tree, are very good to reforme those causes. But this cause is verie speciall, to giue a nere gesse of the Longitude, that is to say, the compasse will varie more quickly (according to the order before written) by which you see they may transport themselves further into the Eastwardes or Westwardes, before that the compasse doth varie one point, than it doth for the other three points, so that they are not able to giue any estimation at all, by the varying of

Of slow-varying of

The Regiment for the Sea. 72

of the Compasse to know any Longitude: so that they ^{the compas.} may trauaile more then the quarter of the circumference of the earth, befoze the compasse will be varied one point backwards and forwards.

And furthermore, it is verie good for them that are maisters or Pilots of shippes, to note, when they do fall with any land where the compasse is varied, to make a remembrance in a booke, how many pointes and Degrees the compasse is varied in euerie place where they come vnto, which will be a great helpe for them to finde that place againe. And to finde the variation, it is declared in the first chapter.

Of making
notes of y
variation.

A Hydrographicall discourse to shew the passage vnto Cattay five manner of waies, two of them knownen, and the other three supposed; wherein you shall know the distaunce vnto Cattay, and also by what points or winds of the compasse that you shall saile for the attaining thether, & also the rest of the East Indies.



Whereas it hath bene oftentimes in question of late yeres now in this our age, for the discouerie for to finde out a way to come vnto Cattay, China, and the Ilands of Moluccas: with other places in the East Indies; I haue thought it good to write this Hydrographicall discourse, to goe vnto Cattay five manner of waies, for that there are some people that are doubtfull whether y there be any such place, other some are doubtfull that there is no passage thether.

So some holding one oppinion and some another, I haue taken

The Regiment for the Sea.

taken vpon me for to shew vnto them the passage to goe vnto Cattay fūe manner of waies, whereof two of them are knowen, and the other three supposed.

Wherein I haue set downe perticularly the courses, that is to say, by what point of the compasse y you must saile, and also the distance what number of leagues that it is from place to place, hauing perused the best Cosmographers, and for that we haue no Charts or Plats Hydrographical that both shew the true courses and distance, it is possible that is not exactly true, but onely to glaunce somewhat nere the matter: Therefore you must not looke to haue it so certaine that there is no error in it, neither am I assured that it is not altogether vntue, either in the distance or courses, but that you may haue some aide by this, &c.

To goe vnto Cattay that way that the Portugalls, doth goe vnto Calicut and the Ilands of Moluccas, which is about by Cape bone Sperace, after that thou art departed from the Lizard or Cape of Cornewall, being the Westerne part of England, you must make your direction from thence vnto the Canarie Ilands, hauing Latitude twentie eight and a halfe, the course is nere the south south-west about fūe hundred leagues.

And on the starre board side is the West Ocean sea, and on the Larboard side, first the coast of Fraunce, then the coast of Spaine and Portugall, and then the coast of Barbarie in Africa, &c.

From the canarie Ilands you must set your course vnto Cape de verde in Ginney, the Latitude thereof is nere 15 degrees, and the course is south about 270 leagues, & on the starboard side is the West Ocean sea, and on the larboard side the coast of Barbarie and Ginnye, from Cape de Verde you must goe vnto Cape Palmas, the Latitude is nere 4 degrees, & the course is south and by East, about two 130 leagues, and on the starboard side is the Ocean sea,

Sea, and the larbord side, the coast of Ginnie, And from thence make your direction to Cape bone Sperance, leeing the southermost part of all Aethiopia, forsaking the coast, and making your course thoro the sea, the course is nere the southeast and by south, 1060 leagues, and the Altitude is the Antarticke Pole, about thirtie five degrees aboue the Horizon, and on the starbord side is Brasile in America, and the great Riuer of Platte, and on the larborde side is the coast of Castill de Mine in Ginnie & Binney, and the coast of Aethiopia, &c. But if y you will keepe the coast of Ginnie, then being departed from Cape Palmas, goe vnto the Iland of Saint Thomas, your course is East and by south, nere five hundredeth firtie leagues, and the Iland of saint Thomas hath no Latitude, for that it is directlie vnder the Equinoctiall, and on the starbord side is the Ocean Sea, and on the Larbord side is the coast of Castell de Mine, and the coast of Binnie, &c. And from the Iland of Saint Thomas, vnto Cape bone Sperance, the course is south and by East, about seauen hundredeth firtie leagues, and on the starbord side is the Ocean sea, and on the larbord side the coast of Aethiopia: from Cape bone Sperance, you must set saile vnto y great Iland of saint Laurence, namelie to the Westermost part of the Iland, and that hath Latitude toward the Antarticke Pole, aboue 28 degrees, and the course is from Cape bone Sperance, Northeast and by East, about 550. leagues, on the starbord side, is the vnknown land that lyeth towards the Antarticke Pole, and on the larbord side the coast of Aethiopia, and the length of the Iland is about 360 or 400 leagues, and the longest way of the Iland both lye East Northeast and West southwest, and is from the mayne land of Aethiopia about eightie or 100 leagues, &c. Furthermore by the waie, I do thinke it good for to shew the course and distance vnto the red sea, and also the course and distance vnto Calicut. To sette

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out

The Regiment for the Sea.

out your course from the Eastermost ende of the great I^land of saint Laurence, which hath the Antarticke Pole raised 13 degrees, towards the Straights of the redde sea, the course is North and by East about 470 leagues, & the latitude of the Straights, is about 10 degrees, towarde the North Pole, & this Straights is greatly occupied, for that all the Spices that serueth the Turkes dominions, and also some parts of Christendome, is brought from the I^land of Moluccas and other parts in the East Indies, as Calicut, and such like places, and so by shipping transported into the redde sea, and so put on land in Aegypt and carryed ouer a little part of the land, and then they are newly embarked, & brought downe to the great Riuer Nilus, and put a land at Alexandria in Aegypt, that is a Port in the midland sea, and from thence they are transported by shipping vnto a number of places both in the Turkes dominions, and other places Christened, &c.

From the Straights vnto the hether ende of the red sea in Aegypt, the course is for the most part Northwest and more Northwest, about nere 500 leages. And going into the read sea, the starbord side is the coast of Arabia, & the larbord side is first the coast of Aethiopia, and then the coast of Aegypt, &c.

And also if that you will goe from the East end of the great I^land of Saint Laurence, vnto the famous merchant Towne called Calicut in Indie, then your course is Northeast and to the Eastwards about 860 leagues, and the latitude is five degrees to the North partes, and on the starbord side is the Ocean sea, and the Larborde side is the first coast of Aethiopia, and the Straights of the read sea, and the coast of Arabia, and the Straights of the Persians sea, and the I^land of Ormes, &c. But if y^e you will holde on your course to go vnto Cattay, then from the east end of y^e great I^land of S. Laurence, to y^e great I^land called Traprobane, your course is, East Northeast, or East, & by

by North about 1100 leagues, but it is possible, that in these courses, you may meete with a number of Ilands, for that all this East Ocean sea is verie full of great and small Ilands, and the middle of this great Iland lyeth directly vnder the Equinotiall, and the length of this Iland is nere 300 leagues, and on the starboard side is the vnknown lands, towards the Antarticke Pole, and on the larboard side the straights of the redde sea, Arabia, the Iland of Ormes, the Persian sea, Calicut, & the great riuer of Ganges. And now for to depart from the great Iland of Traprobane, to goe vnto the the great Iland of Gilolo being the greatest Iland amongst all the Moluccas, the course is East about one thousand leagues, but there lyeth a number of Ilands in the way, and on the starboard side is the Iland of Iaua and Borneo, and on the larboard side, the greatest heap of the Moluccas Ilands. The Iland of Gilolo hath no latitude, for that it lyeth directly vnder the Equinotiall from the Iland of Gilolo vnto the coast of China, the course is North & by west, about five hundred leagues.

The latitude of China is about 25 degrees and on the starboard side is the south sea, and America, and the larboard side is the Ilands of Moluccas: but for to goe from the great Iland of Traprobane, the next way to China, the course is North-east and by East, 1000 leagues, and then on the starboard side, you shall haue all the Moluccas Ilands, and on the larboard side the maine land of Asia or East India, and then from the coast of China, vnto the great Bay of Quinsay in Cattay, the course is North and by East about 100 leagues, & the entraunce of the Bay of Quinsay, the latitude is 35 Degrees, and on the starboard side is the firme land of America, and the great Iland of Iupan, and the larboard side the coast of China and Cattay, &c.

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Now thus much haue I said as touching the waye to come out of England to goe vnto Cattay, and East India, hoping that the reasonable Reader will not enuie mee, for this vsing my discourse, neither you must not looke so exquisitely vnto it, for that it cannot be the exact truth: for as I doe suppose that no English man hath seene any true Charte or Plat of all the East India, wherefore I doe suppose that you will beare with this my discourse, &c.

And now furthermoze as touching this discourse for to come out of England to goe vnto Cattay, the second way, and that is knowen that the sea will let them haue passage, that is to say, through the Straights of Magellane, and so into the south sea, as this, first to make their direction from the west part of England vnto y^e Straights of Magellane, although that in deede there can be no long passage by sea, but that the ships are to seeke some places for to water at, and other easements, yet notwithstanding I doe meane to make but one direction or course from England vnto the Straights of Magellane, for that the Maisters or the Pilots may seeke their watering places most best for their purposes, &c. From the Lizard vnto the Straights of Magellane, the course is for the most part south southwest and to the westwards, about 2400 leagues, and the latitude of the Straights is 52 degrees & a halfe towards the Antarticke Pole, & on the starbord side is the firme land of America, and the Larbord side Europe and Africa, &c.

And through the Straights, the course may be West or West southwest one hundredeth or 140 leagues before that they be cleerely in the south sea, and now being into that Sea, they may goe either into Cattay or the Moluccas, or the Port of Panama, that is the place, that the king of Spaine hath all the treasure that cometh from Peru. And from thence it is caried vp a certain riuer, & transported

ported ouer the necke of a land, & then imbarcked & brought
downe an other Riuer, and so landed at Nombre di dios,
and from thence transported by Shippes into Spaine,
&c.

Being through the Straighes of Magellane, if that you
will goe vnto the Port of Pannama, then your course is
foz to goe Noznozwest, o2 nozwest and by Noze, o2 Noze
and by west, as the land will giue them passage, foz that
there hath not bene made any true Plats foz that coast
in that sea, and doth containe in leagues from the Straights
vnto the Port of Pannama, one thousand one hundredzeth o2
1200 leagues. But if that you will go from the Straights
vnto Cattay, as it is a sea that is not vnto the South
partes neere the Straights well knowen, so there may lye
many Ilands in that sea that you may meeete with, and
also there may be rockes and daungers ther in like man-
ner that are not knowen, but the generall course is Noz-
west vnto Cattay o2 China, about 2800 leagues, hauing
on the starbord side the maine land of America, and on
the larbord side the vnknowne land that lyeth towarde
the Antarticke Pole, and also the Ilands of Moluccas &
Calicut, and thus much haue I said as touching the pas-
sage vnto Cattay, by these two waies that are knowen.
But heere is one thing to be noted, foz as it hath bene re-
ported, that the Portugalls Carickes going vnto Calicut,
when that they be at Cape bone Sperance, then they doe
not directlie set their course the next way, but stand south
ouer towards the land that lyeth to the Antarticke Pole,
wardes, and the cause thereof, the great Current, that
is at Cape bone Sperance, continually running from the
East into the west, and then when that they haue gone
a hundredzeth o2 a hundredzeth and fittie leagues vnto the south-
wardes of the Cape, then they sette their Course foz to
go, with Calicut, so that outwards they do not come neere

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the great Iland of saint Laurence, but goe a great deale to the southward of it, so that they will not be let by the great current: But when that they do come homewards, then they doe come hard by the Ile of saint Laurence, & so directly with Cape bone Sperance, so that they will haue all the helpe that they may with the Current, then they goe west & west into the sea with the maine lande of America, til that they be halfe that sea ouer, and then they doe set their course to goe homewards, as it is not vnknownen, that when the Spanish Fléete doth goe outwards to the west Indies they do goe vnto the Canaries, and so west into the sea, and so holde in by the south land of y Bay of Mexico, so that they haue some help by the current: but when y they do come home, thē they do come by y north land of y Bay of Mexico, betwēne y Iland of Cuba & Terra Florida, so that they will haue y Current homewards to help them. Also it is reported that in the Straights of Magellane that the Current runneth continually from the East into the west. Now thus much haue I said, as touching the two waies vnto Cartay, so that it is knownen that there is passage by sea, if that it were attempted, although the passage is verie long, &c.

The third way, that is not knownen, but supposed that it may be passageable, is by the Northwest, the which of late Captaine Forbisher hath begun, to enter into, and hath discovered it as farre as a place now called Meta Incognita, which he himselte did call Forbishers Straights; but yet notwithstanding it is doubtfull, whether that be a straightes to giue passage to come into the East Ocean sea, or south sea, so any thing that is knownen yet; it may be as well a Baye as otherwise, but notwithstanding whether that be a straight or not, it is possible that there may be passage there about, betwēne the Norther part of America, as betwēne Labradore and Gronland, and such lands as lye toward the North Pole.

Wherefore

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Sir Humfrey Gilberts passage to Catay.

Wherefore now for to departe from England to go vnto Cattay by the Northwest, first in making your direction from the West parte of England, vnto the place called Meta Incognita, the course is West Northwest about six hundredth fiftie leagues, and the latitude thereof sixtie three degrees, and on the Starbord side is first Ireland and Iseland, and Freeseland, and on the Larbord side, is the Ocean sea. Being at Meta Incognita, you must discouer thereabouts, where that you may finde sea for to giue you passage, and yet if you doe finde sea, you must hold on your course west vntill that you haue passed one thousand, or one thousand one hundredth leagues. For if that you should hold on any southerly course, you should imbave your self in the maine land of America, for the extention of the backe side, or North side of America, is not much lesse then one thousand leagues, before that you shall open the way into the East Ocean sea, and in this west course on the Starbord side is the North Pole, and such lands as lyeth that way if there be any, as on the Larbord side, is the maine of America.

And after that you haue sailed west one thousand leagues on the North part of America, you may then direct a more southerly course, because then you may be open of the East Ocean sea, for the most parte of the best Cosmographers laye the opening of that Sea opposite vnto vs in our Meridian, then holding on a southerly course, you may hale vnto the great Baye of Quinsay about foure hundredth or five hundredth leagues. And the latitude of the north part of the Bay of Quinsay in Cattay is about fortie six Degrees, and on the Starbord side is the coast of Asia, as Mangie and Cattay, and on the Larbord side America. And thus much haue I saide as touching the third way to goe to Cattay, &c.

The 4. way to go vnto Cattay, not knowne but supposed,

is

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is by the North-east part or North part of Russey, about by that way that Master Burrowes began the discovery, about by a land y^e is called Noua Zembla, which is a country or point of a land that extendeth to the Northwardes, it is not knowen how farre, & yet it may be possible that it is nauigable that waies if it were attempted.

I will a little vse my discourse concerning the passage that way vnto Cattay. The way and distaunce vnto the North Cape in Norway is not vnknown vnto a number of sea-men, the Latitude thereof is 71 Degrees twentie minutes, therefore I doe thinke it best to beginne the direction and setting out the course East, vntill that they doe come to the land of Noua Zembla, and then falling with that place they are to make their discouerie as y^e land will giue them leaue, and so in this direction it may be possible that they may finde a sea to giue them passage. It may be also y^e when they may meete with land, they shall be constrained to goe North-east or north North-east, vntill that the north Pole be raised eightie or eightie five Degrees, yet they may holde on their course vntill such time as they shall be incumbered with Ice, for it may be so, that in the Latitude of eightie Degrees, there shall be no Ice, although that on the coast of Baccalaos, you may haue Ice, in the Latitude of fiftie Degrees, for no man can tell vntill such time as it hath made experience, and now in this passage vnto the Eastwards from the north Cape vntill that they shall haue the sea open to come into the Southwards in the sea of Cattay, it may be about one thousand, or 1200 leagues, and then in this passage on the starboard side is first Norway and Lapia, and the Bay of saint Nicolas, and the great riuer of Ob and Noua Zembla, & the East parte of Asia, and on the Larboard side the north Pole, and those lands that lie that wayes if there be any, and now in the following of the coast of the land which may be South-east or South Southeast or South, it may be five hundred or

600. leagues vnto the Bay of Quinsay in Cattay, and on the Starbord side is Asia and the coast of Mangie & Cattay, & on the larbord side the maine land of America, &c.

And furthermoze, it may be possible for to finde passage for to go to Cattay, betwene Noua Zembla, and the countrie of Samwetes, through the sea of Vagates, & this passage may be somewhat shorter, then for to goe vnto the Northwardes of Noua Zembla, and then you shall haue in this passage vpon the Starbord side, first the countrie of Samwetes, as Pichora, and the river of Ob & Tartaria, &c. And on the Larbord side, Noua Zembla, &c.

And this I doe ende as touching the Northeast passage to goe or attaine vnto Cattay the fourth waie, &c.

As touching the fifth way to goe vnto Cattay, it may be that in my discourse it may seeme a meere follynesse and a thing vnpossible for it to be done, and yet notwithstanding no man can tell, befoze that it is put in experience, & yet it is the neereff way if that it be nauigable, & my meaning is this, for to goe directly vnto the Pole, if so be that there be no land to let the passage. Now it is possible that some will say that it is the frosen Zone, but notwithstanding if that there be not land that way, then it is not frosen, for the great salt sea neuer freezeth, and whereas you doe see the great quantitie of Ice on y coast of Labradore and Bacalayas, it is a token that there aboutes is much land towards the North Polewardes, and so is frosen in soundes and Riueres, and in the breaking vp of the yeare, it doth come drining out to sea: for in respect they doe seldome see any Ice at the North Cape, nor one hundred leagues North off from thence, it is a great token that ther is no land towards the Polewardes, and befoze that it hath bene put in pzoofe it cannot be known.

But all the doubts for going vnto the Polewardes, are for feare of to much cold, & yet notwithstanding it may be

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reason.

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reasonable warme right vnder the Pole for anye thing that is known vnto the contrary, by the long continuance of the Sunne in summer, for that in the time of 9 weekes, the sunne is neuer lesse than 20 degrees aboue the Horizon going round about them, so that the continuance of the sunne must enforce the aire to be reasonable warme, especially if that there be no Isle dwelling in the Sea, for it is not so cold at Meta Incognita, if that they be not amongst the Isle, for if that they bee at Sea and not amongst Isle then it is very warme, and also if that they be a shore, then it is warme in like manner, so that the colde is caused by no other meanes, than by the cold breath or aire that cometh from the Isle. And now for to procede: to goe vnto Cattay, you must go directly North, till that you be right vnder the Pole, and then go south to the opposite part beyond the Pole, which may be done if y you be not let by anye land that lieth in the way. The whole distance in this course from the riuer of Thames vnto the Bay of Quinsay, is but 1680. leagues, which is a very short way in respect of the other. But now it is possible that some will make argument & say, that it is not possible for any man to make anye direction, or set any course being directly vnder the pole, for that it is not known which way that the Compasse will stand, and also in like maner being vnder the Pole, all places is south which way so euer you go, and also the sunne is equally one height, so that you can make no proofe which way is forwards, and which way is backwards: therefore it is to be supposed, that some will say, that it is not possible to make any instruments to assigne any course to any place appointed: for truth it is, that being vnder the Pole, any place assigned is south from vs, what quarter of the world so euer we are in, and if that the sea will giue vs passage, our course is south to go vnto it, &c. Yet notwithstanding, I will shew vnto you what you shall doe to make a perfect direction vnto any place appointed, being

being right vnder the Pole, so that you shall know whether you do go backwards or forwards, or any other way that you shall appoint, so that you may see the Sunne, and that must be done thus. First prepare a perfect good clock that goeth with a Spring, the which clocke must be made in that order that the directer or pointer may goe round in 24. houres, and it must so bee marked, that it may end 24. houres at none, and then to begin one, this clocke or Diall being well made, and keeping the time truly, when that you doe approach nere the Pole within 100. leagues, that is the latitude of 85 degrees, (for so farre the Compasse may serue, & also you may correct the Compasse well inough, for that the Sunne is 10. degrees higher on the south part, than it is on the North part) and now being within 5 degrees of the Pole, set your clocke to worke, and let the 24. houre be none, and then when that you are directly vnder the Pole, looke if that the pointer dooth stand vpon the 24. houre, then that part or quarter that the sunne is in, is right backe againe, and if that it point 12. hours, then towards the sun-wards is right forwards and if that it point 6. houres, then the part of the worlde towards the sun is due west from you, and is one quarter of the earth, that direction will set you right vpon it, and if 18 houres, then towards the sun doth appoint you that place that is East one quarter of the earth, &c.

And now for to let any course to stirre the ship vpon to any place appointed, note this for an ensample, I would go directly home-wards, and then I will set the Flie of a Compasse before him that shall stirre: and for so much as I come out North, and I must goe home South, I lay the Carde or Flie steadie before mee, and the South point right with the ships head or Stemme, and so I doe set the Clocke by it, now if that the Clocke dooth point twentie foure houres, for that alsoe was my none, then I do stirre the shippe right vpon the sunne, and if the Clocke doth ap-
U. ii. point

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poyn^t 3. houres, then he that doth stirre must keepe the sunne vpon the south west, & so shall the ship goe that south that she came from, and if that the clocke doth poyn^t six houres, then he that doth stirre, must keepe the sunne vpon the west point, and if the clocke shew 9. then keepe the sunne vpon the North west. If the clocke doth shew 12 then the sunne must be on the North poyn^t, that is right with the starne of the shippe. And if the clocke doth shew 15 houres, then he that stirreth must keepe the sunne vpon the North east point, if 18. then must he keepe the sun on the East point, and if 21 houres, then on the southeast point, &c. But now if that you would go directly forwards, then lay the North point right with the shippes head, and when the clocke doth point 12 then stirre right vpon the sunne, & so in like manner must you stirre by the sunne as I haue afoze shewed you by ensamples, so that you may see by this clocke or diall, how you may assigne your selfe to keepe any course into any place in the whole world, you being vnder the Pole, and then when that you are departed from the Pole 100 leagues, that is 5 degrees, then you may vse your compasse, and correct it by the sunne at your pleasure. And thus much I haue said as touching the passages to go vnto Cattay, wherfoze gentle reader beare with my rudenes, for that I am so bold to vse my discourse vpon the passage vnto Cattay. And furthermoze, some men hath ben of that opinion, that when that they are in the East Ocean sea that they shall meete with no shipping, as about Cattay and China, &c. But notwithstanding it is a sea wherein there is a huge number of ships both great and small, for whereas there is such great trade of Marchandize, & also such a number of Ilands both great and small, & also such a number of commodities in those Ilands, any man may iudge that it is likelie that there is great store of ships, and also ordinance in their shipping, &c. And it is not vnknownen but that the great Cane of Cattay, is

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Of great Canes Naues.

SS a Prince of great power as well by sea as by land; then
Iudge you whether that such a Prince of such a force and
wealth, will not provide for all things meete for warres.
Therefore as soone as they come into those coasts they
must orderly vse the trade of Marchandize, and not vse
+ force, &c. Moreover upon a time I being with Master Dee
at his house at Murclacke, and falling in talke about the
the discoverie to Cattay and the shipping their abouts; ther-
upon he opened a booke and shewed me a note what num-
ber of ships the great Cane had readie at one time to goe
vnto sea about his affaires; you would thinke it incredible,
for the number was 15000 which is an huge armie by
Sea. I replied againe that it might be that they were but
small things, and yet they might call them shippes; & then
he turned vnto another place where the great Cane did
send one of his daughters by sea, & did appoint 14. of his
ships, & the least of the 14 ships had 250 Mariners, beside
all the rest of his daughters traine and such po-

bles as did accompanie hir, which could

be no small number. Therefore

it is most manifest that

the Cane is a great

Prince of power

as well by

sea as by

land.

FINIS.

A Table of the declination of the seuerall degrees of ech signe calculated by
T.Hood according to the greatest declination of the Sunne
which is now 23.degrees 28.minutes.

| Degrees of the Signes. | Aries | | Taurus. | | Gemini. | | Degrees of the Signes. |
|---------------------------|--------|-----------|----------|-------------|--------------|----|---------------------------|
| | Libra. | | Scorpio. | | Sagittarius. | | |
| | D. | M. | D. | M. | D. | M. | |
| 0 | 0 | 0 | 11 | 29 | 20 | 10 | 30 |
| 1 | 0 | 24 | 11 | 50 | 20 | 23 | 29 |
| 2 | 0 | 47 | 12 | 11 | 20 | 35 | 28 |
| 3 | 1 | 11 | 12 | 32 | 20 | 47 | 27 |
| 4 | 1 | 35 | 12 | 52 | 20 | 58 | 26 |
| 5 | 1 | 59 | 13 | 12 | 21 | 9 | 25 |
| 6 | 2 | 23 | 13 | 32 | 21 | 20 | 24 |
| 7 | 2 | 47 | 13 | 52 | 21 | 30 | 23 |
| 8 | 3 | 10 | 14 | 12 | 21 | 40 | 22 |
| 9 | 3 | 34 | 14 | 31 | 21 | 49 | 21 |
| 10 | 3 | 58 | 14 | 50 | 21 | 58 | 20 |
| 11 | 4 | 21 | 15 | 9 | 22 | 7 | 19 |
| 12 | 4 | 45 | 15 | 27 | 22 | 15 | 18 |
| 13 | 5 | 8 | 15 | 45 | 22 | 23 | 17 |
| 14 | 5 | 32 | 16 | 4 | 22 | 30 | 16 |
| 15 | 5 | 55 | 16 | 21 | 22 | 37 | 15 |
| 16 | 6 | 18 | 16 | 39 | 22 | 44 | 14 |
| 17 | 6 | 41 | 16 | 56 | 22 | 50 | 13 |
| 18 | 7 | 4 | 17 | 13 | 22 | 56 | 12 |
| 19 | 7 | 27 | 17 | 29 | 23 | 1 | 11 |
| 20 | 7 | 50 | 17 | 46 | 23 | 5 | 10 |
| 21 | 8 | 12 | 18 | 2 | 23 | 10 | 9 |
| 22 | 8 | 35 | 18 | 17 | 12 | 13 | 8 |
| 23 | 8 | 57 | 18 | 33 | 23 | 17 | 7 |
| 24 | 9 | 19 | 18 | 47 | 23 | 20 | 6 |
| 25 | 9 | 41 | 19 | 2 | 23 | 22 | 5 |
| 26 | 10 | 3 | 19 | 17 | 23 | 24 | 4 |
| 27 | 10 | 25 | 19 | 31 | 23 | 26 | 3 |
| 28 | 10 | 46 | 19 | 44 | 23 | 27 | 2 |
| 29 | 11 | 8 | 19 | 57 | 23 | 28 | 1 |
| 30 | 11 | 29 | 20 | 10 | 23 | 28 | 0 |
| Virgo. | | Leo. | | Cancer. | | | |
| Pisces. | | Aquarius. | | Capricorne. | | | |

Fo2somuch as it is méete and
conuenient fo2 a Sea-faring
man to bee able to finde out the
declination of the Sunne conti-
nuallie, not onely by the help of
the Table befoze set downe ac-
cording to the daie of the moneth
but also according to each seue-
rall Degree of any signe which
y sun possesseth, therefore I hane
heere adioyned a Table of decli-
nation calculated according to
the sunnes greatest declination
which is now esteemed to be 23.
D. 28 minutes. The vse of the
which Table is as followeth.
First you must search out by the
Ephemerides (fo2 that is best to
bee followed by y common sort)
the place of the sunne, that is to
say what signe and degree & mi-
nute the Sunne possesseth. Se-
condly you are to consider whe-
ther the name of the signe which
the sunne possesseth be set at the
toppe, or at the bottome of the
Table. If it stand at the toppe,
you must seeke the Degree of the
saide signe on the left hand of y
Table descending downewarde.
But if the name on the signe be
at the bottom of the Table, you
must seeke y degree on the right
hand.

A table of the declination of ech signe

hand ascending upward. Then going on directlie from y^e degree forward out either towards the right hand or toward the left as occasion requireth vntill you come right against the name of the signe which the sunne possesseth you shall finde the declination. As for example: suppose the place of the sunne were the 24 degree of Aries. The name of the signe standeth at the toppe of the table, therefore I seeke out the 24 degree on the left hand, and going on from thence toward y^e right hand vntill I come right against Aries, I finde the declination to be 9 degrees 19. minutes.

Againe suppose the place of the Sunne to be the 24 of Cancer: I see the name of that signe to stand at the bottom of the Table, therefore I seeke out the 24 Degree on the right hand, and going on from thence toward the left hand, vntill I come right against Cancer, I find the declination to be 21 D. 20 minutes.

Thirddie in the vse of this table you are to note whether there be any minutes Adherente, and adioyned to the degrees of the signe, which the sunne possesseth yea or no, as whether the Sunne possesseth preciselie the 24 degree of Aries or the 24 degree and the 27 40. or 50. minute. &c. If there be no minutes ouer, and aboue the Degrees then the foresaid Table in such manner, as I spake of before affordeth the declination.

But if there be minutes adioyned to the degrees, then by proportion (otherwise called the rule of three) you must seeke out what declination may belong vnto the said minutes in this manner.

The first number in the proportion must alwaies be 60 minutes because we argue from a degree, which is 60 minutes to the parts of a degree, which are the odde minutes Adherente to the whole degree. The third number must alwaies be the odde minutes adioyning to the Degree of the signe which the signe possesseth: for the questi-
on

A table of the declination of ech signe

on is moued concerning thee . The middlemost or second number in the proportion must be the difference of declination betweene the declination of the degree, which the sunne possesseth, and the next degree immediatelie following according to the naturall succession of the numbers. The which difference may easelie be found by the subducing of the declination of one degree out of an other. The second number being found, and all of them being orderly set downe as the rule of three requireth, multiplie the 3. by the second, and diuide the product by the fourth, the quotient affordeth the proportionall part answerable to the minutes propounded.

This proportionall part must be added to the declination of the degree assigned, if the name of the signe stand at the toppe of the Table, but if the name of the signe stand at the bottom of the Table it must be subducted, so shall you finde the declination of the degrees and minutes. As for example suppose the sunne possesse the 22 degrees 22 minutes of Aquarius, what shall his declination be? The first number in the rule of proportion must be 60 minutes, the third must be 22. (for they are the odde minutes adioyned to the degrees) and the second number I finde thus The sunne possessing the 22 D. of Aquarius declineth 14 degrees 12 minutes, and possessing the 23 of Aquarius he declineth 13 D. 52. m. the one of these subducted from the other. I finde the difference of declination to be 20 minutes, this is the second number in the proportion, where vpon I say if 60 giue 20 what shall 22 minutes giue. The quotient according to the rule, is 7 (the fraction being neglected as the custome is in these matters because the common sort careth not for the seconds &c. And because the name of the supposed signe which the sunne possesseth, standeth in the bottom of the Table therefore I subduct the said 7 minutes out of the declination belonging to the 22 degree, and finde the declination of

A table of the declination of ech signe

of the 22 Degrée 12 minutes of Aquarius to be 14 Degrès 5 minutes.

Againe, suppose that the Sunne possesseth the 16 Degrè 25 minute of Taurus, what shall his declination be. The difference of declination betwene the 16 and the 17 degré of Taurus is 17 minutes wherevpon I say. If the sunne in going one whole degré, (that is 60 minuts) do decline 17 minuts, what shal his declination be in going 25 minuts. The quotient according to the rule is 7. minutes. And because the name of the signe which the sunne is supposed to possesse standeth in the toppe of the Table, therefore I adde thre 7 minutes to the 16 degré 39 minutes, which is the declination of the 16 degré of Taurus, and there vpon inferre the declination of the 16 Degrè 25 minutes, to be 16 degrés 46 minutes. Thus much breifely concerning the finding out of the declination of any degré which the sunne possesseth.

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FINIS.

The Marriners guide.

Set forth in forme of a dia-

logue; wherein the vse of the plaine Sea

+ Card is briefelie and plainly deliuered,

to the commoditie of all such

as haue delight in

Navigation.

Written by Thomas Hood,

gabriel harvey



*The most sensible
& familiar Analysis
of the Sea-Card,
that ever yet came
in print.*

¶ The contents of the booke are
set forth in the page
following.

Ignoti nulla cupido.

¶ Imprinted at London by Thomas Est,
for Thomas Wight,

1592.



The Contents of this booke.

- 1 What things are especially to be noted in the Sea carde.
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- 3 From a point giuen in the carde to drawe a line paralell to any point of the compasse.
- 4 To finde the latitude of any place assigned in the Carde.
- 5 To finde how many minutes are contained in any part of a degree of latitude described in the carde.
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- 8 The Rhombe being and the latitude to finde how farre you haue gone.
- 9 The way which the shippe hath gone being giuen, & the Rhombe to finde the latitude.
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- 15 How to keepe your trauerse vppon the carde.
- 16 How to keepe your trauerse vppon the Carde of a small pricke as well as if it were of a great pricke.
- 17 How to keepe your trauerse vpon the carde though the land lie verie nigh the edge thereof.

TO THE HONO-
rable Sir Iohn Bur- +
rowes Knight.

IT may seeme (Hono-
rable Sir) a bold at-
tempt, that vppon so
small acquaintaunce I
should presume to dedi-
cate this worke vnto you: but the cause,
that moueth me so to doe, being accor-
dingly waighed, wilbe (as I hope) a suf-
ficient excuse for my presumption. The
worke it self concerneth the vse of that,
which is most necessarie in Nauigati-
on; to the which you beare an Honora-
ble regard. The desire of knowledge +
hath moued you to beare mee good wil:
I my selfe haue alwaies wished well to
those that imploy their mindes to navi-
gatiō, & finding proceeding from your
A.ii. owne

ON The Epistle.

own self a fauorable inclinatio towards mee, I could not but expresse a dutifull signe of a minde alwaies ready to do you what seruice or pleasure my smal habilitie will afford; the which signe as I suppose could not more conueniently be deliuered then in the didication of this worke: which if it shall please you pardoning my boldnesse, so to interpret, as it is ment, and honorably to protect it against my ill willers, I shalbe ready to vndertake a farther matter for my countries good, and to pray for your happie successe in all your affaires.

Yours at your Honorable

commaund T. Hood.

To the industrious Saylors health and prosperitie.



Entlemen Saylors, and what soeuer else you
are that trauaile by Sea, for your sake I
haue vndertaken this paines. I haue had to
doe a long time with diuers of your profes-
sion both for the making of Sea Cardes; and
also for instructing them in mathematicall
matters belonging to Nauigation. Amongst whome I
haue found many willing to learne, & by that meanes had
an insight into their wants. I found certaine defects in
pricking and vsing of the Card; & therefore I haue writ-
ten this little dialogue concerning the vse of the same;
which if you please to peruse at your leasure, I hope you
shall finde that therein, which shall be profitable to the ig-
noraunt, and not vnpleasant to the skilfull; howsoeuer it
shalbe either pleasant, or profitable, if you vouchsafe to
take it in good part, it wil be a meanes to moue mee, to a
farther laboure for your commoditie.

Yours Thomas Hood.



THE INSTRUCTIONS TO THE JURY

The first duty of the jury is to listen to the evidence
presented by the parties to the case. They must
listen carefully to the testimony of the witnesses
and to the arguments of the lawyers. They must
decide whether the evidence is credible and whether
it supports the claims of the parties. They must
also decide whether the law has been correctly
applied to the facts of the case. The jury must
return a verdict based on the evidence and the law.
The jury must also decide on the amount of damages
to be awarded to the plaintiff. The jury must
decide whether the defendant is liable for the
damages and, if so, how much the plaintiff is
entitled to receive. The jury must also decide
whether the defendant is entitled to a judgment
in his favor. The jury must return a verdict
based on the evidence and the law.

THE VERDICT
OF THE JURY

The vse of the common Sea Card, 4
written in forme of a dialogue.

○.

M. Now in god sooth Philomathes welcome, you are the last man whom I thought off, and I wished for, to the intent that I might haue a word or twowith you, concerning the commoditie which your Mathematicall Studies haue afforded you, in matters of Nauigation.

P. Sir I thanke you most hartelic for your good remembrance, and I must needs confesse, that there was no man, with whome I more desired to speake then with you, partly that I might thankfully acknowledge the profit reaped by your instruction, and partlie that I might request of you a farther matter, which being obtained, I shall thinke it no small increase of that heape of benefits, which manytimes I haue receaued at your hands.

M. Speake on Philomathes what may it be which you desire, you may commaund me in any reasonable request.

P. Being at sea we were dyuen too and froe, as winde and weather serued vs, hauing sometimes the light of the Sunne, sometimes of the starres, & sometimes being de-
prived of them both for a long season: yet notwithstanding the master of our shippe and his mate, with dyuers other of the company, had certaine plats as they learned them (such as you commonly make, though I neuer greatly had regard to their vse) wherein they could keepe a reckoning of the waie, which they had made, and set downe a pyncke representing the place wherein they were, and perforce many other pretie conclusions. He thought it was most pleasant to see them do it, though I were much grieved with mine owne ignorance in that matter: yet hauing an hope by your meanes to attaine to the knowledge thereof, I made such hast after mine arriual, as
my

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my businesse would afozd to come vnto you, that I might be instructed in the vse of the foresaid Card.

M. Oh Philomathes, that were a dangerous matter for me to vndertake, partly because herein I might seeme to doe, as Phormio the Philosopher dyd, who, though he had neuer sene any camp, dared notwithstanding to discourse of warlike affaires befoze Annibal, and partly because I should seeme to institute this kinde of protection of the plaine carde, which I cannot safely defend, because it is erroneous. +

P. What, is it faultie? I pray you by what reason doe you proue your saying: they haue bene vsed, and are yet retained by most excellent Nauigators of our time.

M. I know it well Philomathes, that they are retained by many excellent men, but yet with this dayly wish, that the same might be amended, and that there might a better protection be made: but hereby you may perceiue the error of these plats, in that the Meridians being parallel, the degrees of longitude and latitude which are in them haue not in any respect that simmetrie & proportion one to another, which y^e Globe requireth: for in this plain description of the card, the degrees of longitude & latitude in each leuerall parallel are of one quantitie, & the Meridians meeting with the parallels, make perfect squares, which is contrary to the nature of the Globe, wherein the Meridians tending to one pole, either North, or Southward, the degrees of longitude in each parallel betwene the equator & the pole, wax shorter & shorter, according as the parallels come nearer & nearer to the pole, & the meridians meeting with y^e parallels, make vnperfect squares, which the Geometricians call Trapezia.

P. In deede I remember that the saylozs many times haue acknowledged some such kinde of fault, & by supposition imagining that two ships comming from the equator, and being two hundred leagues a sunder, should bend their

their course Northward, vnder the Meridian, vntill they came to the 60 parallel, by the plaine card they cannot be found to be lesse then 200 leagues distant one from an other, which is vnpossible, considering that the 60 parallel, is but halfe the content of the equator, and therefore those two Shippes should be but halfe that distance one from an other, which they were distant vnder the equator, namely, 100 leagues. Moreover I haue heard them acknowledge this, that there are three things which they can very hardly bring to geather vpon their plat, without committing an error in the one of them, that is to say; the point of the compasse; vpon which they saile the distance, and the latitude: besides the land is greatly distorted from his naturall forme, so that it is nothing like vnto that which wee see described vpon the Globe: but notwithstanding all these things alleaged, either by you or mee, let my request preuaile, which is, that you wil vouchsafe to teach mee how to vse the plaine card.

M. If you will needes haue mee fulfill your desire Philomathes, I will doe what I can to satisfie you, crauing notwithstanding, that this my deede be not prejudiciall to any other mans, whose experience in Hydrographicall matters is more then myne: when his discourse cometh forth, let it be accepted as it shall deserue; in the meane season, let this serue the tourne.

P. Goe to then, first let vs consider what things are described in the card; secondly, what vse they haue.

M. The things described in the card, and especially
 1. to be noted are these. First the Hydrographicall description of the sea coast. Secondly the lynes drawen ouer the face of the whole card, and concurring one with another ioyntly together in sondry places of the card in one point, which I terme the center of the flie, for instruction sake, following y common phrase of speech. These lynes are

What things are especially to be regarded in y sea-card.

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commonly called the points of the compasse; but in teaching because I would gladly auoyde the tediousnesse of that name, therfore hereafter I will cal them Rhombes, following the Spanish appellation, who hath so intituled them, in (that vpon the plaine Carde especiallie) they represent after a sort the Geometricall figure, which is called a Rhombe. The names of these Rhombes are particularlie expresse by certaine letters, both in the toppe, and the bottome of the Carde; the which letters haue this

signification.

ss.

| | | |
|----------|--------------------|--------------------------|
| N. | } Signifi- eth. | North. |
| N.B.E. | | North and by East. |
| N.N.E. | | North north East. |
| N.E.B.N. | | North East and by north. |
| N.E. | | North East. |
| N.E.B.E. | | North east and by East. |
| E.N.E. | | East north east. |
| E.B.N. | | East and by north. |
| E. | | East. |
| E.B.S. | | East and by South. |
| E.S.E. | | East South East. |
| S.E.B.E. | | South East and by East. |
| S.E. | | South east. |
| S.E.B.S. | | South East and by South. |
| S.S.E. | | South south East. |
| S.B.E. | | South and by East. |
| S. | | South. |
| S.B.w. | | South and by west. |
| S.S.w. | | South south west. |
| S.w.B.S. | | South west and by south. |
| S.w. | | South west. |
| S.w.B.w. | | South west and by west. |
| W.S.w. | | West south west. |

W.B.S

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| | | |
|----------|-------------|--------------------------|
| W.B.S. | Signifieth. | West and by South. |
| W. | | West. |
| W.B.N. | | West and by North. |
| W.N.W. | | West north west. |
| N.W.B.W | | North west and by west. |
| N.W. | | North west. |
| N.W.B.N. | | North west and by north. |
| N.N.W. | | North north west. |
| N.B.W. | | North and by west. |

And here I must tell you this Philomathes, that so much as the maine vse of the Card dependeth vpon these lines, therefore you must endeavour your selfe toth and naile, to be readie, not onely in the names, that you may say your Compasse both sozward and backward, but also in the lines, that seing of any line, you may be readie to name it; and the line being named, you must be redy presently to finde it vpon the card.

The third thing to be noted, are the degrees of Latitude, contained betwene two small lines on the left hand of the card, & hauing their numbers adioyned vnto them seuerally. The fourth & last thing is the scale of leagues both English and Spanish, set on the right hand of the card. These are the cheefest things to be observed: as for the cyphers set at the vpper and nether ende of the card round about the flies, they shalbe expressed hereafter in their place; because they are not essentiall matters touching the substance of the card, but voluntarily set downe for remembrance sake.

P. Well then I pray you let mee vnderstand the vse of the forenamed things.

M. The ende of the Hydrographical description of the coast is to lay forth vnto vs, not onely the Baies, Capes, Angles, Plands, Mountaines, Ports, Points, and Ryuers, but also the daungers of the sea, so farre forth as they

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they may conueniently bee deliuered to the eye : in the which you are to note, that b signifieth a Baie, c a cape : a an angle, i an Iland : y as Ilands : m a mountaine, po. a port : pa. a point, r, a ryuer, x a rocke, & a rocke with other great daunger, if it haue prickes, the sands are expressed by small prickes.

P. There is no difficultie in vnderstanding of this; what say you of the lines which you call the Rombes.

1 Propo: M. They haue this vse to direct or sette our course from place to place, so y^e vpon them dependeth y^e answer vnto this proposition: Two places being assigned to finde y^e Rhombe, y^e is to say, the point of the compasse vpon which they lie, & how we are to direct our course from the one vnto y^e other. The which proposition is to be perfozmed 2 seuerall waies generallie or perticularlie. The generall waie is that which teacheth vs to finde out the Rhombe howsoeuer the places beare one from an other, whether they lie iust vpon a Rhombe as preciselie North, North East, or South south West, or North & by East &c : or whether they bend somewhat more towards the east, west, north, or south, as when they lie north west, & half a point to the westward, or south east, & halfe a point or a quarter, or three quarters to the east ward, &c. The which way to finde the Rhombe generallie is in this maner. Hauing found out in your Plat the 2 places assigned which I suppose to be M. N. Laie a straight ruler vpon them (if you please you may draw a line with a fine blacke lead, from the one place vnto the other, extending it at large ouer the carde, both aboue and beneath the 2 places assigned, but it is needelesse for the laying downe of the ruler is as much as the drawing of the line) marke where the saide ruler, or line if it bee drawn cutteth any one Rhombe (which or whensoever it is) of North and South as for example [the line M. N. cutteth the middlemost

blemost Rhombe of North and South in the point S. Then take the Semidiameter of the Circle. A B C D. namelie the line AE. and according to that Semidiameter vppon the point . S . describe an arcke or peece of a Circle the shortest that may be drawen betwene the Rhombe of North and South, and the line running betwene the two places in such manner as you see the arcke . TV. Take the distaunce of the saide arcke . TV. and counte it from the point B or the point D. either to the right hand, or to the left, according as the situation of the line drawen betwene the two places assigned shall best aduise you, (that is to say, if your course lie Southward and to the East, then count the distaunce from D. toward C. if you runne Southward, and to the West, count the distaunce from D. towards A. But if you sette Sayle to the Northwarde Easterlie, then reckon the saide distaunce from B. toward C. if your course bee betwene the North and the West, let the distaunce bee accounted from B. toward A) the Rhombe which shalbe next vnto the foote of your Compasse, is it vppon which the two places assigned do lie, and according vnto that Rhombe must your course be directed, if the winde will giue you leaue. As in this example, counting the arcke TV. from D. toward A. I finde the foote of my Compasse to light preciselie vppon the Rhombe of South south West, and therefore I say, y that is the Rhombe, vppon which M. and N. doe lie, and according to that point of the Compasse must my course be kept from M. to N.

P. But put case that the foote of my Compasse doth not light preciselie vppon any one Rhombe, but betwene two of them, how shall I then say the places are situated and lie one from an other.

M. In this case you must denominate y positio or lying of y 2 places according to y Rhombe, which shalbe found to be

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next vnto the foote of the compasses, adding these woordes, and a quarter, halfe, or thre quarters of a point more to the South, North, East, or West, as you shall see occasion. This is the generall way to finde the Rhombe.

P. But as I remember I saw y^e saylers work other wise.

M. You say true, for in searching out the Rhombe, or point of y^e compasse, they set y^e one foote of the compasses on the place from whence they put, and aiming, or gessing how the place vnto which they goe may beare from it, they extend the foote of their compasses accordingly as the Rhombe requireth, at the which they gessed, directing the foote of their compasses vpon the saide Rhombe from the place of their departure vntill they come vnto y^e place vnto which they entende to goe: But trust me Philomathes ther is no way more readie & certaine, generally, the that which I haue set downe; for if it be followed precisely according to my prescription, you cannot misse y^e breadth of an haire in finding out any Rhombe betwene 2 places assigned; because it bringeth forth the iust angle of position according to the description of the Carde.

P. I hope practise will bring readines: What is the particular way to finde out the Rhombe.

M. The particular way is that which requireth a certaine position, or situation of the 2 places assigned, & it is twofold, hauing a double worke according as y^e 2 places, are diuerselie situated from, or neare vnto the meridian. For this you may easelie perceiue by your Carde, & by common sence also, that sometimes the assigned place, to which you bende your course, may be verie neare vnto the Meridian of the place, from whence you departe, sometimes the place to the which you goe, may be far off from the Meridian from whence you set saile, and neare vnto the East or West point of the compasse: wherevpon there ariseth a twofold worke in this manner to bee performed. If the places lie neare to the Meridian one of
an:

an other, (namely if they lie not moze then North east, or North west, South east, or South west, one from an other) lay your ruler vpon them both, and mark where it cutteth any 2. of the parallell Rhombes, which runne east and west.

P. Doth it not make any matter which two parallels they be, which the ruler cutteth, whether they be in the middest, at the bottome, or at the top of the card.

M. It is neither heere nor there, which parallels you make choise of in the performing of this conclusion, but it is best to choise those two parallels, which are nighest together, be they wheresoeuer (so that the ruler doth touch them both) for sauing of your labour in extending of your compasses; as for example: if that I were to goe from M. vnto N. I lay my ruler vpon them both, and finde that it cutteth all the parallel Rhombes of east and west, from N. downward in the points, A. B. C. D. and E. but I make choise onely of the two nethermost parallels, and with my Compasses I take the distance betwene the 2 points D. and E. wherein the ruler cutteth the parallels.

P. When this distance is taken, what is then to be done, and how must I proceed to finde the Rhombe?

M. Your Compasses being kept at their extent, make choise also of the centre of some one sie, being in either of the two foresaid parallels. (as for example,) I make choise of the center E. which is in the vppermost of the two parallels in that center E. I set the one foote of the compasses, and tourne the other foote downward to the other parallell, setting it precisely in the same: The Rhombe, vpon which the foote of y compasses doth fall, is that, where on the two places assigned doe beare one from an other, as for example, I finde the foote of the compasses to light iust vpon the Rhombe of South Southwest, wherefore I conclude that to be the point of the compasse vpon which N. beareth from M. and according to that (so nere as
map

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may be) must I shape my course.

P. Yet here ariseth one doubt, which is this, when I set the one foote of my compasses in the one parallel, and tourne the other foote toward the other parallel, is it not materiall which way I turne the saide other foote, either to the right, or to the left hand?

M. Yes, it is greatly to be regarded, and this must be your general rule, namely that as your ruler lieth so must your compasses be situated, that is to saie, the right line supposed to be drawen from the one foote of the compasses vnto the other, must be parallell to the side of the ruler: so shall you be sure to finde out the Rhombe, because this is a principle, as it were, concerning the Rhombes described in the plat, that all lines either actually, or by imagination equidistant therein one vnto an other, haue one and the same denomination.

P. And as I gesse, I must obserue that also in that rule, which you taught mee befoze, namely, that if the foete of my compasses being situated orderly, shall not precisely touch any of the Rhombes, then am I to entitle the position of the two places according to that Rhombe which shalbe next vnto the foete of my compasses, adding these wordes and a little more to the Southward, or Northward, &c. As the fall of the compasses shall best aduise mee.

M. You say well: Thus much concerning the first particular way of searching out the Rhombe, when the two places assigned lye neare to one an others Meridian. But if it shall so fall out, that the two places assigned in your plat lie not neare vnto one an others meridian, but beare almost East and West one from an other, then can you not vse the former way conueniently, because either the compasses will not reach the two parallels of East & West, as they dyd befoze, or else their extent wilbe very great, and the intercection of the ruler and the parallels wilbe so oblique, that you cannot iustly discerné where to
pitch

pitch the foote of your compasses. Therefore in this case you shall work thus. Lay your ruler vpon the 2 places assigned, and mark where it cutteth any two Rhombes of North and South (which hereafter for instruction sake I will call Meridians, because in deede they are so) As for example, I lay the ruler vpon O. and P. and finde it to cut all the Meridians from P. toward my left hand, but for the performance of this conclusion, I make choise onely of those two which are next vnto P. toward the sayde hande, the which meridians are cut by the ruler in the points F. and G. Take the distaunce of these 2 points, & setting the one foote of your compasses in any center of any flie, which is in either of the meridians (as for example, set it in the center W) turne the other foote of your compasses about, vntill the other foote touch the other meridian (prouided alwaies that the situation of your compasses be like vnto the situation of the ruler) the Rhombe vpon which the sayd foote of the compasses doth either precisely light or come nearest vnto, is it, which giueth the denomination to y^e position of the 2 places assigned, whereby in this example I say that P. beareth from O. west & by South, & O lieth from P. East and by North. Thus much briefly for finding out the Rhombe either generally or particularly.

P. It followeth therfore now to speak of the degrees of Latitude. 3.

M. You say trew Philomathes, so our methode doth require, that wee should procede, but for so much as mine experience in pricking of the card is more then yours, I think it not amisse to teach you a conclusion (which is the conuerse of y^e which went before) because it is of great vse: you haue learned how to finde out the Rhombe y^e thereby you may direct your course frō place to place, now learne this also from a point assigned in the card whersoener, to draw a line parallell to any Rhombe assigned. But be-
2. Proposi-
tion.

C.

foze.

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foze I procéde I must aduise you of this, that the word Rhombe in this proposition must be largely taken, as it was befoze, not onely fo2 any line of direction vsually expressed vpon the carde, but also fo2 any line by imagination conceaued to be drawen betwéene them, as that which is drawen South West and halfe, o2 a quarter, o2 thre quarters of a point to the westward, and such like, wherevpon we say y this conclusion may be wrought also either generally o2 particularly. For this you know y sometimes we may name a Rhombe precisely & simply, without any addition, as when I say that from y point O I would haue a Rhombe drawne west & by south directly: sometimes we name a Rhombe with this addition a quarter, halfe, o2 thre quarters of a point moze toward such o2 such a coast, as when I say y from the point I. I would haue a Rhombe drawen south east & by south & half a point moze vnto the eastward: How soeuer the question is propounded, you shall generally absolue it thus. From the point assigned (as fo2 example, from I) draw an infinite right line (that is to say, a line long enough to serue your turne) parallel to y next meridian line (if the point assigned be not in y meridian, fo2 the this labour is saued) Afterwards with your compasses take the length of y semidiameter E D which is at the nether end of the card toward y right hand, according to that semidiameter vpon the point geuen, namely vpon I, describe an arcke o2 péce of a circle K L.

P. But where o2 on which side of y line shal I describe the said arck, shall I describe it aboue, o2 beneath y point assigned, againe shall I describe it on the right o2 on the left hand?

M. You must describe y foresaid arck according as your course requireth, y is to say, if your course lie to the southward, easterly, o2 full east, describe the arcke beneath the center o2 assigned point toward the right hande, if your course

course lye southward, westerly, or full west, describe it beneath the center or assigned point toward the left hand. If your course lye northward, easterly, or full east, describe the foresaide arcke above the assigned point toward the right, but if it be northward westerly, or full West, describe it toward the left hand: as in the example propounded, because from the point I. it is required that I should draw a line South East and by South, and halfe a point more to the eastward, therefore the foresayde arcke K L. is described beneath the center or assigned point toward the right hand.

P. Hether to I vnderstand you: but let vs procede, when as vpon the center or assigned point I haue described an arcke according as my course directeth mee, what must I then doe?

M. If your course lie Northward set the one foote of your compasses in the point B. which is on your right hand toward the bottome of the carde, but if your course lie Southward, set it in the point D. and extend the other foote vnto so much of the circumference, as is contained betwene B. or D. and the Rhombe assigned, as in the example propounded, I extend my compasses from D. to the Rhombe of South east and by South, and halfe a point more vnto the Eastwarde, that is to say, I take the distance betwene D. and X. and then setting the one foot of my compasses thus extended in the beginning of the arke, which I drew before, namely in the point K with the other foote I make a marke in the same arke in the point L. The right line drawn from I. (which is the point geuen) vnto L. is the line desired parallell to the Rhombe of South East and by South, and halfe a point more vnto the Eastwarde, for it maketh the same angle with the meridian I K, which the line E. X. maketh with the meridian E. D.

C. ii.

This

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This is the generall and most certaine way of drawing the Rhombe from a point giuen. But if it so fall out that the Rhombe, which is to be drawn from the point assigned, be simply named without addition of halfe a point more or lesse toward such, or such a coast, then you shall describe y^e said Rhombe thus. Among all y^e lines described ouer the face of the carde, seeke out (so neare vnto the assigned point as may be) such a line as beareth the same denomination with the desired Rhombe: as for example, if from the point Q. you were enioyned to draw a Rhombe southwest and by west, seeke out a line that may beare that denomination, (the which as it falleth out in this card is that line that commeth from the westermost part of England to the yland of Faial among the Acores, namelie the line y.Z. Then setting the one foote of your compasses in Z, that is, in the assigned point put forth, or pull in the other foote so long, vntill you may but touch the line y.Z. Afterwards set the one foote of the compasses in some other place of the line y.Z. either to the North or Southwarde as the desired Rhombe shall best aduise you, as for example in the point Z. and with the other foote make an arcke of a Circle, on that same side of the line, vpon which the assigned point is, namelie the arcke R. the right line drawn from Q. the point assigned to the top of the saide arcke is parallel to the Rhombe desired. Thus much concerning the finding out of the Rhombe, and the manner how to draw a line parallel vnto any of them from a point assigned. Let vs now procede Philomathes to the vse of the degrees which consisteth in this especiallie, anie place being assigned in the carde to finde the latitude thereof.

3 Propo:

P. By the Latitude you meane the distaunce of anie place from the Equinotiall either to the North or Southward, according as it is commonly taken in Geographi-
call

call matters.

M. I doe so vnderstand it, and here you must note also, that so much as the Latitude of any place, and the height of the Pole at the same place are all one in number, though they be counted in severall maners & from dyvers places, (for the latitude as you knowe is counted from the equator toward the Zenith, or verticall point in the heauen right imminent ouer the place wherein we are; but the height, elevation, or altitude of the North point is counted from the Horizon to the Pole it selfe) therefore they are usuallie confounded, and we say that by the carde we may finde in what height any place is, or what altitude or elevation the Pole hath aboue the Horizon of any place expressed in the Carde: whereas in truth the Degrees commonly expressed in the Carde are not the Degrees of the elevation of the Pole, but the Degrees of Latitude. The which Latitude of any place assigned is found out thus.

Set the one foote of your compasses in the place assigned (as for example in the point O.) and with the other foote take the shortest distaunce from thence to the next paralell of East and West, either aboue or beneath it, so that your Compasses being stretched forth, you may but touch the paralell. The running with your eye along that paralell towarde the Scale of Latitude, marke where the paralell cutteth the said Scale, there set the one foote of your Compasses, and turne the other either vppward or downeward in the same Scale, as the place assigned shall best aduise you, the Degree vppon which the foote of the Compasses lighteth, expresseth the Latitude of the place, and consequently what height you are in.

As in this example you shall finde the point O. to bee in the fortie Degree of Latitude. And here you are to
C.iii. note

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note that if the place assigned be in any parallell of east and West, then is your labour saued, for the parallell it selfe directeth you to the Latitude.

A brife
rule con-
cerning
the find-
ing out of
the lati-
tude.

P. I perceave your meaning well: and me thinketh I could frame a short rule vnto my selfe wherby to finde the latitude in this manner. If from the place assigned to the scale of latitude there be a right line drawn parallell to the Rhombe of east and west, the degree of the scale vpon which the said parallell lighteth expresseth the Latitude sought for: as you may perceiue by the line O.G. which cutting the scale of Latitude in the 40 Degree, expresseth the latitude of O.

M. Your rule is good: And here you are to note, that when you search the latitude of any small yland in the Carde you must take your measure from the middelt thereof.

P. In searching out the Latitude of many places, there is one thing that troubleth me, because I know not what to saye certainlie. When my compasses light preciselie vpon the beginning or ende of a Degree, then can I tell the iust latitude of the place, because the seuerall numbers adioyned expresse the same: But if the Compasses fall betwene the beginning and ending of a degree, what shall I then say?

A propo-
sition.
How ma-
nie mi-
nutes are
contained
in each
part of a
degree.

M. If the foote of your compasses falleth iust in the middelt of a degree, there are 30 minutets to be added to the number of the whole degrees: if it falleth on the 4 part you must adde 15 minutes: if on the third part, you must adde 20 minutes.

P. I graunt that also, but considering that this carde yea & very few others haue such subdiuisions into quarters or terces of a degree, I pray you giue me some generall rule wherby I may know what minutes are answerable vnto any part of a degree contained betwene the beginning of the saide Degree, and any picke made
at

at all adventures within it.

M. If you doe remember it, I deliuered vnto you such a conclusion in that booke which I wrought concerning the vse of both the Globes terrestriall and celestiaall. The selfe same rule which I did there write touching the Degrees of a circle either of the Globe quadrant, or astrolabe, may be here applied to a right line deuided into degrees. Therefore whenas the foote of your Compasses lighteth betwene the beginning and ending of any Degree, and you are desirous to know what number of minutes that part of the degree may containe which is betwene the beginning of it and the foote of your compasses, you shall satisfie your selfe in this maner. Take the portion of the degree assigned, and beginning at the neithermost degree of the carde, count it from thence vntill you haue reckened it 60 times noting well, where you make an ende, for the number of the whole degrees comprehended betwene the degree where at you first began, and the point wherein you ended, expresse the number of minutes contained in the portion of the degree propounded. Otherwise to auoide y^e tediousnesse of turning the compasses ouer so many times, you may doe thus: count the said portion of the degree 5. times ouer, noting well wher your compasses lighted at the first time, from thence extend y^e foote of your compasses vnto y^e degree where at you began, & from y^e degree count the saide distance 12 times ouer, noting well where your compasses lighteth at the 12 time. for (as I said before) the number of the whole degrees comprised betwene y^e degree wher at you first began & the point wherein you ended expresse the number of minutes contained in the portion of the degree propounded. Now if it shall so fall out at any time, that the portion of the Degree betwene the beginning of it and the foote of your Compasses shall be so little, that your Compasses cannot bee brought close enough together to take it
(as

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as many times it falleth out by reason of the ill workmanship of the compasses) then take the portion of the degree remaining contained betwene the foote of your compasses and the ende of the said degree, count that portion as you did the other, noting how many degrees of the scale of latitude are contained betwene the place where you began, and the point wherein you ended, that number of degrees being subducted from 60 expresse how many minutes are contained in the foresaid small portion. Forouer if the number of the degrees in the scale of latitude be so few, that you cannot account the portion of the degree assigned 60 times, then count it but 30 times, & double the degrees contained betwene the beginning and the ende of your account or else count the saide portion but 15 times, and quaduple the saide degrees. So shall you also finde the minutes. As for example, if in counting the portion of the degree assigned 15 times ouer, you finde 11 degrees and a quarter to be contained betwene the place where at you beganne, and the place wherein you ended, multiply those degrees and the quarter by 4. and you shall finde 45 minutes to be contained in the portion of the degree assigned.

P. Now tell mee this I pray you, were it not good that the degrees of latitude were greater.

M. It were good in dede for him that is but a yong scholler in pricking of his card, but otherwise to an expert and cunning man it is neither here nor ther, though they were halfe so small againe: And I will teach you hereafter how you shall keepe your trauesse vpon your card though the degrees of latitude be but small, as well as if they were two inches long.

4.
The vse
of y scale
of leagues.

P. Let vs now procede to the scale of leagues what vse hath it?

M. The vse thereof is to finde out the distance betwene place and place: So that the conclusion to be performed

formed thereby is this: two places being assigned to finde their distance. In working of this conclusion, this is to be noted, whether the places given are of lesser distance, are farther of one from an other, then the length of the scale amounteth unto. If the two places be of lesser distance then the length of the scale (as the points I and H are) extend your compasses from the one unto the other, and apply them afterward to the scale of leagues (beginning at the left ende thereof) & you shall finde the distance of the places assigned either according to the English or Spanish account. But if the distance of the places assigned surmounteth the length of the scale of leagues, then with your compasses take either the length of the whole scale, or some certayne number of leagues, as 20. 40. 50. or 100. and lay your ruler upon the 2 places assigned, or else with a fine black leade draw a line from the one unto the other, afterwards beginning at either of them, count the number of leagues which you take out of your scale (keeping your compasses close by y^e rulers side) as many times as you can betwene them: Still adding the number of the leagues as you goe on. If at length the foote of your compasses lighteth iust upon the other place assigned, then both the totall summe of the leagues added togeather expresse the distance of the 2 places. But if in setting the foote of the compasses forward, you finde that it falleth beyond the place propounded, then bearing in mynde the totall summe of the leagues all readie reckoned, & pulling in the foote of the compasses untill it touch the place assigned, & applying them unto the scale of leagues, you must adde the leagues contained betwene their seete, unto the summe found out befoze and noted in your mynde, so the totall number expresth the distance of the places assigned. As for example, desiring to finde the distance betwen I and R. I take out of the scale 50 leagues, and counting the said by the edge of my ruler 4 times, which make 200.

D. leagues.

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leagues & turning the foote of my compasses the first time toward y^e place assigned, I finde that it ouer reacheth the place: wherefore bearing in minde y^e former 200. leagues, I pulled in my cōpasses vntil the foote touched the place assigned, and applying them vnto the scale, I found 87. leagues to be contained betwēne their foete, which being added vnto the other 200, declare the distaunce of the 2. places to be 287 leagues according to the English account.

P. In good time were those words mentioned, soz looking vpon the scale of leagues I founde on the vpper part thereof these wordes English leagues, and vnder it Spanish leagues: what meanes these wordes.

M. They are there set to signifie the difference betwene vs as the Spaniards in counting of distances. We attribute vnto euerie degree on earth (that is vnto the 360. part of the Compasse of the earth) 20 leagues, each league containing 3 miles, so that we make y^e whole compasse of the earth to be 7200 leagues, or 21600 miles. The Spaniardes hauing their miles longer then oures, attribute vnto each Degrē but 17 leagues and a halfe, so that by their account the circuite of the earth is 6300 Leagues, and one of their miles is vnto one of our lesquiseptima, that is as 8. is to 7, and seauenty, of their Leagues make eightie of ours. Wherevpon you shal note this, that many times 2 places are saide to be of a diuers distaunce one from an other, yet are the places set wher they ought to be, and ther is no errour in the Carde, but the difference ariseth vppon the account diuerselie made betwēne vs and the Spaniards. As soz example from Cape Finister vnto Po. Santo according to the Spanish account are 200 leagues, but according to our account it is moze by 24. wherefore in picking of your Carde you must haue a deligent eye to your scale, least in mistaking the one kinde of Leagues soz the other, you mis-

misrecken your selfe and finde fault with your Carde where there is none. Is there any thing else which you would craue concerning the scale?

P. Yea, I haue a questfon or 2. to be asked. If there be no scale in my Carde what shift shall I vse to make on?

M. I tolde you euen now that euerie Degrée according to the English account is twentie Leagues, therefore five Degreés are one hundredeth leagues, and 2. Degreés and an halfe are fiftie Leagues, so that if you take five degreés of the scale of Latitude, and diuide them into 10 partes, each portion shalbe 10 Leagues, and each of them diuided into 5 partes, are 2 Leagues. But if you diuided the 5 Degreés into 8. partes then is eache parte 12 leagues and $\frac{1}{2}$. The Spanish scale is thus made, 80 English leagues as I said before, are but 70 Spanish, therefore if you take foure degreés of Latitude & diuide them into 7 partes each portion is 10 Spanish leagues.

P. I perceaue that I may make my scale of Leagues by the degreés of Latitude. I pray you therefore contrariwise tell me, when the Carde hath no degreés of Latitude, but a scale of leagues how shall I finde out the length of the Degreés of latitude wherby the carde was made?

M. The quantitie of each degreée of Latitude is easely found out by the English leagues, because 100 English make iust 5. degreés: but if the leagues be Spanish, you must diligentlie note this, whether the greater diuisions of the Scale containe severallie 10 leagues or 12 & $\frac{1}{2}$. If they containe 10 Leagues a peece, seven of them diuided in 4. partes make 4 degreés, but if the foresaide partes bee eache of them twelue Leagues and $\frac{1}{2}$. then take seauē of them which amount vnto eightie 7. leagues and $\frac{1}{2}$. & diuide them into 5. partes which make 5. degreés

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of Latitude euerie one contayning seauentéene leagues and $\frac{1}{2}$.

P. The thirde thing which I stand in doubt off is this: when the Carde hath neither Degrées of latitude nor scale how I shall make them both.

M. This cannot be done vnlesse y the distaunce betwéene some 2 places in the carde be certainly knowen, and then it may be gathered out of that which hath béene said before, especially if the two places assigned lie North and South one from an other. As for example, if I know that the distaunce betwéene cape Vincent and the rocke is 40 English leagues or 2 degrées of Latitude, I may out of that distaunce easilie gather the quantitie of my scale of Leagues and degrées.

P. Let vs now procéde: Hether to we haue spoken of the Rhombes, of the scale of Latitude, and the Scale of leagues, as they were to be considered seuerally eache one by it selfe; what is to be considered in them béeing ioyned used and linked one with an other.

5 Propo: M. There arise out of them béeing ioyned together, many conclusions: As first of all this, The Rhombe being given and the Latitude with which you fall to finde the distaunce or the way which the ship hath made from any place assigned. The performance of the which proposition may thus briefly be deliuered. If from the place assigned there be a right line drawn paralell to the Rhombe assigned, and from the degré of latitude there be an other line drawne equidistant to the Rhombe of east and West, cutting the foresaide line in some certaine place. The length of the right line contained betwene the point of the interfection where the cutte is made, and the place of your departure being applyed to the Scale of leagues expresth the distaunce or the way which the shippe hath made.

As

As for example. I suppose that from the point N. I went South and by East 3 quarters of a point more to the Eastward untill I sette with the 40 degree of latitude. Therfore (by the second proposition of this booke) from N. I draw a line parallel to the Rhombe of South and by East, &c. and from the 40 degree of latitude, I draw an other line parallel to the Rhombe of East & West, the 2 lines drawen concurre and meete in the point O. the length of the line N.O. applyed to the scale expresseth the distance to be 75. leagues. An other conclusion is this: The distance or way which the shippe hath made being giuen and the Rhombe to finde in what latitude you are. The proposition is thus perfozmed. If in the right line drawen from the place assigned parallel to the Rhombe giuen, belimited according to the scale of leagues, the distance or way which the shippe hath made, the right line drawen from the ende of the said distance parallel to the Rhombe of East and West shall cutte off in the scale of Degrees the latitude sought for. As for example from N. I went South & by East 3 quarters of a point more to the Eastward seauenty five leagues, I demande with what Latitude I fell. From N. I draw a line parallel to the Rhombe of South & by East, &c. (by the position) in the which line I account the distance that is seauenty five leagues from N. to O. then from O. I draw a right line parallel to the line of East and West, which cutteth the scale of Latitude in the fortye degree which is the degree sought for.

6 Propo:

The third conclusion is this. The distance being giuen and the Latitude to finde the Rhombe. Your rule is this: If from the Latitude giuen toward the place assigned there be a right line drawen parallel to the Rhombe of East and West, and on the place assigned being the center therbe a circumference described, hauing for his Semidiameter the distance giuen, and

7 Propo:

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cutting the foresaid parallell at all adventures in a point on that side of the meridian on which your course doth lye the right line drawen from the place assigned to the sayd point where in the section was made, shall expresse the Rhombe desired. As in this example. Suppose that going from N. 75. leagues, I found my selfe to be in fortie degrees of Latitude, I would know upon what Rhombe my course was made.

From the 40 degree of Latitude, I draw a line O G. paralell to the Rhombe of East and West. Then with my compasses I take out of the scale 75 Leagues, and setting the one foote of them in N. (that is in the place assigned from whence I departed) with the other foote on the right side of the Meridian, because my course lyeth Easterly, I make a circumference, cutting the line OG. in the point O. I draw a right line from N. to O. which by the first proposition I finde to be the Rhombe of South East and three quarters of a point more into the Eastward, upon which I made my course.

P. In making of the circumference mencioned in your rule, why doe you bidde mee cut the Parallell on that side of the meridian on which my course doth lye?

M. Because the Parallell lyne which is drawen from the scale of Latitude may be cutte as well on the East as on the West side of the Meridian from whence you depart, and therefore in answering to the former proposition, there is a secrete consideration to be had with your selfe, which way your course doth lye, whether to the right or left hand of the Meridian, the which consideration being had, and the compasses being guided accordingly, we may easely finde out the Rhombe.

P. These three conclusions mee thinketh should be not onely pleasaunt, but also very commodious for the saylor, because by either of them he may easely and readily finde the place wherein hee is, (which as I remember

ber they called the picking of the Carde: for the point wherein the Rhombe assigned, and the Latitude: or the assigned Rhombe, and the distance or the assigned Latitude & the distance doe concurre expresse the place where in hee is.

M. You say trew Philomathes; and for so much as there are three things whereby the sea-faring man may help him selfe by meanes of his card, that is his Latitude, his distance or way which his ship maketh, & the Rhombe upon which he shapeth his course; hereby he may assure him selfe two of them being given (namely the Rhombe, and the Latitude, or the Rhombe and the distance, or the Latitude and the distance whether he hath erred in the other yea or no, and how much he hath erred. As for example: If in sayling from N. to O. South and by East three quarters of a point more into the Eastward, and finding my selfe to be in the 40 degree of Latitude, I shall affirme that I haue runne 75 Leagues, by the first of these three conclusions which is the fifth proposition, I shall certifie my selfe whether I kept the reckoning of my way trew, yea or no, for my compasses being extended to that number of leagues, and the one foote of them being set in N. if the other foote reacheth iust vnto the point O. wherein the Rhombe and the Latitude are supposed to concurre, I may assure my selfe that my distaunce was truly obserued. But if the foote of the compasses shall fall either short of, or beyond the point O. then haue I erred in obseruing the way of the Shippe, and the distance betwene the foote of the compasses and the point O. being applyed to the scale of leagues, expresseth the quantitie of myne error. Secondly, if by the diligence of mine obseruation I can assure my selfe that I haue run South & by east, 3 quarters of a point more to the eastward 75 leagues, and at length obseruing the Sunne or Starre, shall auouch y I am in the 40 degree of latitude: then

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then picking out my course vpon that Rhombe from N to O. if that the right line drawne from the 40 degree of latitude, parallel to the Rhombe of East and West, both not precisely concurre in the point O. but falleth either above or beneath it, then haue I erred in taking my latitude, and the quantitie of myne error is betwaxed by the shortest line drawen from the point O. to the said paralel. In like manner if by my obseruation precisely made, I can warrant my selfe of my distance and of my latitude, & shal auouch, that from the point N. I went South & by East 3 quarters of a point more to the eastward. If from y point N. I draw such a Rhombe (by the 2 proposition) & it shall not concurre in the point O. wherein the latitude & the distance doe concurre, then may I say that I haue erred in the Rhombe, and the quantitie of myne error is to be found by the arcke of the circumference contained betwix the point O. and the Rhombe drawen.

P. I percene that these things doe follow, and are conveniently inferred out of the three former conclusions, but may they be taken as certaine and true?

M. Oh Philomathes, you know I told you before that the plaine card was not in all points correspondent to the dimensions of the Globe, & therefore there cannot a most requisite and a precise truth be warrented thereby; but for so much as the common marriner (the more is the pitty) hath no better help, I teach him & you how to make a benefit and a pleasure vnto him selfe, of that which hee hath, so farre forth as the thing it selfe will permit him. Let vs now procede. This also may be performed vpon the card: Two places vpon the shoare being known, & the point of the compasse vpon which they beare from you, to finde firste how farre distant you are from the shoare, in a direct course, or from either of the two places.

The eight
propositio

P. But is it not materiall whether I be thwart of the one of the two places yea or no?

M. It.

M. It maketh no matter: let them lie from you how soeuer, so that you & the two places be not in a right line. Your rule is this. If from the 2 places assigned there be Rhombes drawn opposite to the 2 Rhombes upon which the 2 places doe beare: the distance betwixt the concur of those two Rhombes and the shoare, or the places assigned, will expresse how far of you are from either of them, or from the shoare if selfe.

P. What meane you by the two Rhombes which are to be drawn opposite unto the Rhombe upon which the two places doe beare?

M. This is my meaning, that if the one place doth lie East and by North, you should draw a Rhombe from it west and by South, and if the other place lie East south east, you should draw a Rhombe from it west north west. For alwaies the concurrence of the opposite Rhombes will expresse y^e place wherein you are, which being once known, you may by the scale of Leagues easely gather how farre you are distant from any place. Moreover upon the card this may be performed: the Rhombe & the distance being geuen to finde how we haue rayled and let fall the Pole. For if in y^e Rhombe assigned (as for example) in the line N O. we count the distance vnto the point O. from the point N. y^e parallels drawn east & west from the points N. & O. shall in y^e scale of latitude comprehend betwixt the degrees which we haue shifted in y^e height of y^e Pole.

The ninth Proposition

P. Now that you haue made mention of rayling the Pole, I pray you tell me, may not this conclusion be wrought vpon the card. In rayling or letting the Pole fall a degree to finde how many leagues we runne vpon any Rhombe assigned.

The tenth Proposition

M. Yes that you may Philomachus, & that so much y^e better in that the question is but of one degree, for in many degrees the error would appeare, as may be gathered by y^e which hath bene said heretofore concerning y^e proiectio of this.

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this card. And forsomuch as each seuerall degree of this card is somewhat to little whereby to work this conclusion conveniently, therefore suppose that 5 degrees of your card were but as one, then must each degree be 4 leagues, and halfe a degree must be 2 leagues. This being supposed, make choise of some one center of a flie with in your card, as for example, I chose y center D wherein the Rhombes doe concur on the left hand of the card: aboue that center from the point F which is distaunt from D the length of 5 degrees counted notwithstanding but as one, I draw a right line parallell to the Rhombe of east & west, cutting the Rhombes proceeding from the point D. in the points A.B.C.D.E.F.G. Then making the line DF your scale, (the which because it is supposed to be a degree, it must of necessitie be accounted for 20 leagues, if you measure ther with the lines Da, Db, Dc, Dd, De, Df, Dg. you shal easily finde how many leagues you run vpon any Rhombe, in rayling, or letting the Pole fall a degree.

11 Propo:

P. Out of this mee thinketh also that I may inferre an other conclusion which is this: The pole being raised or let fall a degree to finde how far I am distant from my meridian running vpon any Rhombe assigned.

M. You say trew: for by the said 5 degrees taken but for one, being in quantitie 20 leagues, you measure the distance betweene the points F and a, P and b, P and c. &c. you shall finde the distance betweene the meridian & each seuerall Rhombe. These conclusions Philomathes, as foresaid, being noted diligently, it followeth now to teach you that, which is the summe of them all, wherein they must all ioyntly concurre together, the which conclusion is this: How to keepe your trauesse vpon the carde. The

12 Propo:

which proposition though it be in wordes differing from the rest, yet is there nothing in it, which hath not bene seuerally deliuered in the former propositions, so that it requireth onely a dexteritie in practising, and working that which

which you haue learned, as that appeare in this example. Suppose that I were to go from H. to Saint Maries I. land, the which 2 places as it may appeare by the 1 proposition doe beare one from an other south west & by south two thirdes of a point moze vnto the westward, and by the 4 proposition I finde them to be 332 leagues a sonder, but making my course vppon the foresaid Rhombe, I was no sooner from y^e shoare, but I was carried first with an easterly winde 100 leagues to the westward. Secondly, I was carried from thence to the South east a quarter of a point moze to the eastward 90 Leagues. Thirdly, the winde comming about, I was carried south south west 72 Leagues. Fourthly, I was driven by tempest south & by east thre quarters of a point moze vnto the eastward I know not how farre, but I found my selfe to be in the 40 degree of Latitude. Fifthly I was from thence enforced west and by South 60 leagues. Sixtly, I was with a contrary winde put North northeast 40 Leagues. Seuenthly, I ranne 160 Leagues I know not vppon what Rhombe certainly, but it was to Westwarde of the meridian, vntill I shifted my Pole foure degrees and a quarter. I demaund in what place I might be, and what Rhombe it was vpon which I ranne last. 2. what Rhombe I should haue kept to the place wherein I finde my selfe to be if I had not founde the winde contrarie. 3. how many leagues I am from the place of my departure. 4. how I haue shifted the Pole. 5. How farre I am from my Meridian. 6. How many Leagues I haue to R. 7. What Rhombe will set my course thether.

P. If it please you sir I will see how I can answere the question.

M. Doe so, it will be good for you alwaies to practise that which you know.

P. First by the fourth proposition from H. westward I count 100 leagues to the point I. Secondly by the 2

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proposition I draw the Rhombe of South East a quarter of a point more to the Easterward, from the point I. and in it from the saide point I. count 90 Leagues to the point M. Thirdly by the second proposition from the point M. I draw the Rhombe of South south West, and count therein leauentie 2 leagues from M. to N. Fourthly by the 6. proposition I finde my selfe to be in the point O. which is in the fortie degree of latitude & 75. leagues from the point N. Fiftlie by the 2. and 4. propositions I finde my selfe to be in the point P. that is west and by South sixtie leagues from O. Sixthe by the forenamed propositions, I finde my selfe to be in Q. which is North North-east 40 leagues from P. Last of all by the seauenth proposition, I aunswere that I finde my selfe to haue kept my course Southwest and by West, and to be at the point R. Secondlie if I had not bene molested with contrarie windes, I might haue runne Southwest and by South halfe a point more to the Westwarde. Thirdlie I am three hundredeth thirtie 2 leagues from H. Fourthly I haue shifted the Pole 13. Degrees. Fiftlie I am from the Meridian of H. according to this proiection of the Carde two hundredeth 14. leagues. Sixtlie I haue vnto the Island of S. Maries, about 12 Leagues, and I must set my course thether westerlie.

M. You haue answered the question Philomathes directie: Where might we make an ende of the vse of the Sea Carde, were it not that I remember you propounded vnto me a question heretofore concerning the degrees of Latitude: whether it were not better for the Marriners vse, if they were greater, then they be vpon this Carde; I must confesse, that generallie all instruments mathematicall to be vsed either by land or sea, are so much y more comendable by how much the more they erre in quantitie: but touching the plaine sea Carde though it be but of a verie small picke, yet may it be vsed as if it were

2. 4. or 8. times so great againe as it is. For as for the Rhombe they serue our vse in a small Carde as well as in a greater, and that so much the better by how much they come the nearer together, so that the compasses need not so large an extention on the small Cardes as they require vpon those which are of a larger picke. As for the smalnesse of the degrees of Latitude, they may be remedied by supposing 2. 4. or 8. degrees to be but as one, and so likewise may the leagues be taken twentie for 10 or for five; and one handzeth may be supposed to be but fiftie or 25. according as you alter the proposition of the degrees of Latitude.

P. I pray you make this thing plaine vnto me, I doe partlie perceiue your meaning by your former wordes: but I would haue the matter laide open moze manifestly.

M. When as the degrees of Latitude in your carde, and the leagues of the scale doe seeme to be too little for your vse. First of all seeke out in it by the first proposition, the Rhombe vpon the place whether you goe, beareth from the place of your departure, seeke out also the Latitude of the place from whence you depart. Then suppose so many degrees of Latitude in your Carde (as you thinke good) to be but one, (for example sake suppose 4. of them to be but one, so that eache seuerall Degree by this supposition is but a quarter, & each halfe degree is but halfe a quarter: and consequentlie in the scale of leagues 80 degrees are but 20, and twentie are but five, and the small space betweene the prickes is but halfe a League) according to this supposition you must picke your carde and keepe your trauerse.

P. That I knowe, but when as I haue kept my trauerse according to that supposition, how shall I reduce the place, wherein I finde my selfe to be by my trauerse, vnto my owne Carde, that my carde being neuer so little I may say that this, or this is the place wherein I am. As

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for example, if I were to go from cape S. Vincent to Porto Santo, my course lyeth south west & by west. And this I perceiue y if I should suppose euerie 4. degrées of this carde to be but as one, I must suppose Porto Santo to lie from cape S. Vincent. 4. times so farre as it doth. Now say y I ranne from cape S. Vincent west south west 60 leagues then by y former supposition I must needs be in the point Z. which in the carde is beyond Porto Santo a great deale to the Westwarde, whereas I should be betwene cape S. Vincent & Porto Santo, therefore I pray you tell mee how in my carde I may make a pycke representing the true place wherein I am.

M. This thing Philomathes is most easilie done if you marke the proportion of your supposition. You suppose 4. degrées to be but as one, therefore the point Z. is 4. times so far from cape S. Vincent as it should be, so that if you diuide the length of the line betwene the cape and the point Z. into 4. parts, the fourth part is y true distaunce from the cape. In like maner if you wold know the latitude, wherein you are according to your Carde it selfe, diuide those Degrées of Latitude which are contained betwene the Latitude of cape S. Vincent and the Latitude of the point Z. into foure equall parts, for the fourth parte giueth the Latitude wherein you are.

This thing Philomathes is worth the obseruing, for by this meanes you shall be able to vse your Carde of what quantitie soener it is.

P. I doe now vnderstand better then I did before, and I obserue this as a generell rule, that I must alwaies follow the proportion of my supposition in finding out either the true Latitude or the true distaunce: for as touching the Rhombe that keepeth still his denomination. So that if I should suppose two Degrées of my Carde to be but as one, then must I take
halfe

halfe the supposed distance for the true distance: and if I suppose 8 Degrées to be but one, I must take the 8 part of the supposed distance to be the true distance, and in like manner must I doe in finding the true Latitude.

M. You say well Philomathes. And here you are to note that you may suppose the place of your departure to be in anie place of your Carde where you thinke most conuenient to keepe your trauesse (or if you will you may keepe your trauesse vpon some blanke skinne which hath nothing in it but the lines) imagining the degrées to be as great as you please, and after ward you may applie it to your Carde by the vertue of the sixt proposition, which teacheth you the Rhombe being giuen and the distance to finde the true Latitude, and consequentlie the place wherein you are, the said Rhombe being drawen, and the distance accounted in your carde from that place, from the which you departed. Doe, ouer if it shall so fall out, that beyond the Ilands or other coast of the land sette downe in your carde, there be not scope enought for you to trauell, either East, West, North, or South, (as for example in this your carde there is not space enough to trauell either from the Terceras westward, or from the Canaries southward) you may by the former rule suppose anie place in your carde to be the place wherein you are, and afterwarde keepe your trauesse at your pleasure.

Thus much briefely Philomathes concerning the vse of this plaine carde, wherein if I haue satisfied you to your contentment, I shall be glad; but this I colde wish, that you should not alwaies addict your selfe vnto this kinde of plat, but labour & strue to be cunning in anie other, that are extant; that comparing the one with the other, you may make choise at the length of the best, though

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though in y meane season you vse this as an help in your trauell. And thus: &c.

P. Now stay a while sir I pray you, there is yet one thing to be spoken of, which are the cyphers sette rounde about the two flies, whereof the one is at the bottome, the other at the toppe of the carde, I would faine know to what purpose they are.

M. You remember that in the tenth proposition, we spake of the Leagues, which we runne vpon euery point of the compasses in rayling, or laying the Pole a degre, these Leagues are expresse in the vppermost halfe of that circle which incompasseth the great flie at the bottome of the carde, from A to B and from B to C and are adioyned to each Rhombe, or point of the compasse, whereof those, which are on the quarter A B are the English, the other on the quarter B C are the Spanish Leagues.

Moreover in the eleuenth proposition, we spake of the distaunce from the Meridian in rayling the Pole or letting it fall a degre sayling vpon any Rhombe assigned. Those Leagues, both English and Spanish, are likewise expresse vpon the nether halfe of the circle, that they might be readie for those which are desirous to know them vpon a sodaine without the vse of the compasse. The other cyphers, which are sette about the flie at the toppe of the carde, serue for the finding out of the height of the Pole by the north or Pole starre, according as it is pointed with the guardes: So that by the placing of the foresayd figures you are to note this that the former guardes being in the East the North starre is one degre and an halfe vnder the Pole, and therefore you must adde so much (for so the letter A doeth signifie) to the height of the starre, that therby you may finde the true height of the Pole.

Item, the guardes in the West the starre is one degre,

grée and an halfe, aboue the Pole, and therefore you must subduct so much (soz to the letter S. doth signifie, from the height of the starre to finde the height of the Pole. In like manner you are to adde or subduct the numbers set vpon the other points of the compasse vnto. or from the height of the North starre according as the letters A. and S. doe direct you. These things Philomathes, the sailors by their long experience, haue noted to be auailable for their vse, and therefore they haue thought it good to put them into their cards, the which things you may apply also to your comoditie as occasion serueth; hauing the meaning thereof laide open vnto you. Hereafter if it shall please you to repaire vnto my lodging being a litle from the Minorites toward the Towar, you shall not onely haue the cardes readie to serue your turne for all places to which there is any trafficque vsed; but I will be readie to farther you in any other Mathematicall conceit, to the vttermost of my power.

P. I know it well, and haue had much experience of your good will; and therefore I thank you and I acknowledge my selfe a debitor for the same. But before wee part, I pray you let mee haue your opinion in this: what thinck you of Mercators card? and wherein differeth it from the plaine card?

M. Philomathes, I iudge it to be an excellent work in respect of the projection thereof; and might (by enlarging of it) be made most fitte and convenient for the saylours vse: It differeth from the common carde in this, that the degrees of Latitude are not equall but were greater & greater toward the pole, wherby ther ariseth a double comoditie; soz by this meanes the land is not so distracted as it is vpon Plancius his Mappe, who followeth the projection of the plaine Carde; & it commeth verie neare vnto the Symmetrie of the globe, because the degrees of Latitude are so projected, that each one of

Mercators Card. Plancius Mappe.

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them may be the scale to measure iustlie the circumference of that parallell which runneth through the ende of the said degree, so that you may trulie measure the distance betwene east and west, and it is therefore the best Carde, that euer I saw extant, whereon you may keepe an account of your longitude. In the vse of it the degrees of the equinotiall are the common scale to measure anie distance assigned; and your reckening must be kept, not vpon the Rhombe vpon which your course lyeth; but vpon that Rhombe, which is so farre distant from the equator, or parallell of east and west, as the Rhombe, vpon which you made, your course was distant from the Meridian. Thus much Philomathes concerning that matter, I feare my speach seemeth darcke vnto you; and my leasure will not now serue mee to shew you the booke, which I haue written concerning the vse of Mercators Carde. Hereafter when moze leasure shall serue I will be readie to let you haue the sight of it.

P. I thanke you, in the meane time I bidde you farewell.

FINIS.



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